37/
35
2

MINUTES OF PROCEEDINGS

OF THE

ROYAL ARTILLERY INSTITUTION.

VOLUME XXV.

WOOLWICH:
PRINTED AT THE ROYAL ARTILLERY INSTITUTION
And Published by Messrs. DULAU & Co., 37, Soho Square, W.

1898.

ALL RIGHTS RESERVED.

72458

20

CONTENTS.

PAGE

The Services of Lieut.-Colonel Francis Downman, R.A. in France, North America, and the West Indies, between the years 1758 and 1784. Edited by Colonel F. A. Whinyates, late R.H.A. 1
45, 101, 153, 209, 235, 373, 429, 493, 529, 565. ... ...

British Gunners at the siege and battle of Narva in 1700. By Charles Dalton, Esq. *Editor of English Army Lists and Commission Registers, 1661–1714* 15

A few plain remarks on the positions and work of the artillery in the field. By Brigadier-General C. H. Spragge, C.B., Commanding Royal Artillery Bombay Army 19

Militia Field Artillery. By Captain J. C. Wray, R.A., Adjutant of the Honourable Artillery Company. 29

Methods of bringing guns into action. By Major-General T. B. Tyler, Inspector-General Royal Artillery in India 35

A short summary of the cover question. By Major J. L. Keir, R.H.A. ... 39

Recruiting. (*A Lecture delivered at the Royal Artillery Institution, Woolwich, 16th December, 1897.*) By H. O. Arnold-Forster, Esq., M.P. 53

Salmon fishing in Eastern Canada. By Lieut.-Colonel J. C. Dalton, R.A. 85

Memoir of General W. H. Askwith, Colonel-Commandant, R.A. 97

Wireless telegraphy and its Military Possibilities. (*A Lecture delivered at the Royal Artillery Institution, Woolwich, 9th Dec., 1897.*) By Captain W. P. Brett, R.E.... 111

A System of Comparing Geographical Distances. (*A Lecture delivered at the Royal Artillery Institution, Woolwich, 14th Oct., 1897.*) By Captain F. J. S. Cleeve, R.A. 133

Outposts for Coast Defence. By Major R. M. B. F. Kelly, R.A. 147

The Artillery at Dargai. By Lieutenant G. F. MacMunn, D.S.O., R.A. ... 173

Documents relating to Egypt, 1798–9. Communicated by Lieut.-Colonel H. W. L. Hime 179

Manœuvres of the XIV German Army Corps, 1897. By Colonel A. E. Turner, C.B., A.-A.-G., R.A. 185

12-pr. Gun with Elephant Equipment. By Captain W. B. R. Sandys, R.A. 225

The Megaphone as a Garrison Artillery adjunct. By Lieut.-Colonel J. C. Dalton, R.A. 231

The Teaching of Mechanics by Experiment. By J. A. Ewing, Esq., F.R.S., Professor of Mechanism and Applied Mechanics in the University of Cambridge. (*A Lecture delivered at the Royal Artillery Institution, Woolwich, Thursday, 10th, Feb. 1898.*) 249

Automatic Sighting. By Colonel H. S. S. Watkin, C.B., R.A., Chief Inspector of Position Finding. 269

Abstract of the Proceedings of the Sixty-First Annual General Meeting of the Royal Artillery Institution 277

The Advantages and Disadvantages of Q.F. Guns for Artillery in the Field. (Silver Medal Prize Essay, 1898.) By Major F. B. Elmslie, R.A. 287

The Advantages and Disadvantages of Q.F. Guns for Artillery in the Field. (Silver Medal Prize Essay, 1898.) By Major N. B. Inglefield, R.A. 307

The Advantages and Disadvantages of Q.F. Guns for Artillery in the Field. (Commended Essay, 1898.) By Captain R. A. K. Montgomery, R.A. 325

The Advantages and Disadvantages of Q.F. Guns for Artillery in the Field. (Commended Essay, 1898) By Captain H. W. Barlow, R.A. 337

The Advantages and Disadvantages of Q.F. Guns for Artillery in the Field. (Commended Essay, 1898.) By Lieutenant A. S. Buckle, R.A. ... 357

The Mechanism of Bicycles. Illustrated by specimens and drawings. By Major S. B. von Donop, R.A., Professor of Artillery at the Royal Military Academy, (*A Lecture delivered at the Royal Artillery Institution, Woolwich, Thursday, 10th March, 1898.*) 385

The Artillery in the Rebellion of 1798. By Lieutenant T. M. Kough, R.A. 413

The Diary of the 10th Field Battery, R.A., with the Malakand Field Force. By Lieutenant C. N. B. Ballard, R.A.... 419

Quick-fire guns for Field Artillery. A discussion of the essays rewarded and published in the 'Duncan' Gold Medal Competition, 1898. *Held at the Royal United Service Institution, Whitehall, Wednesday, 13th July, 1898* 439

The development of armour during the years 1893–98. By Captain C. Orde Browne, late R.A, ... 463, 509, 549, 585

On the word "Gonne" or "Gun." By Lieut.-Colonel H. W. L. Hime, late R.A. 485

Practice seawards. By Captain J. H. Mansell, R.A. 489

Morris Tube Practice. By Lieutenant G. C. Sturrock, R.A. 505

Q.F. Field Artillery fire. By Lieutenant C. H. Wood, R.H.A.... 523

Observations on Mr. Kinglake's Narrative of the bombardment of Sebastopol in April, 1855. By Colonel F. A. Whinyates, late R.H.A. 527

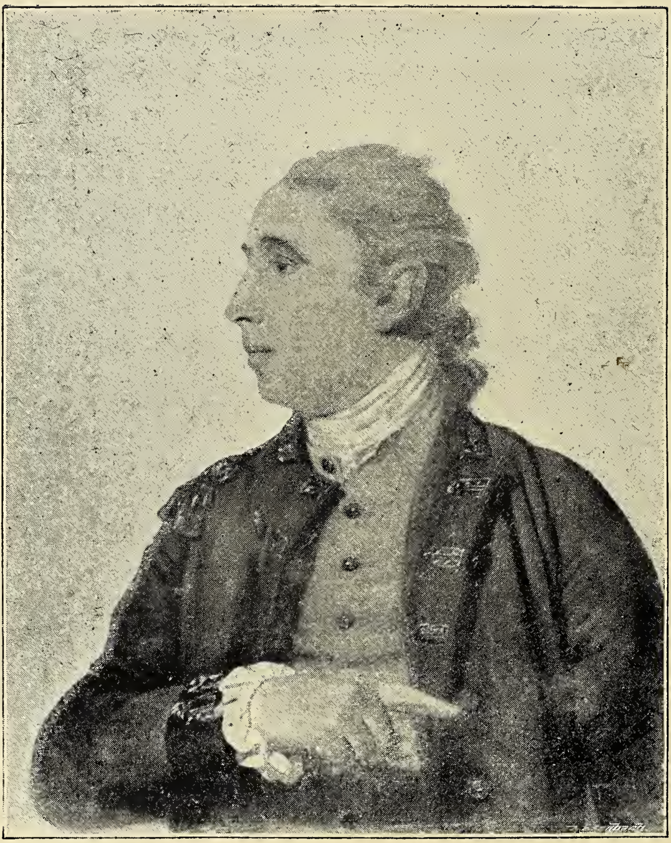
On failures at practice with the Time and Percussion Fuze, Mark IV. By Major W. A. Urquhart, late R.A. 539

Röntgen Rays up-to-date. *Précis of a Lecture delivered at the Royal Artillery Institution, Woolwich, 27th January, 1898.* By W. Webster, Esq., F.C.S. 545

Marching through jungle across India. By Major P. H. Enthoven, R.A.... 559
Reconnaissance by Artillery. By Brigadier-General C. H. Spragge, C.B. ... 579
Who invented the Leather Guns? By Lieut.-Colonel H. W. L. Hime, late R.A. 595

LIST OF PLATES.

TO FACE PAGE
Map of Eastern Canada 96
Wireless Telegraphy and its Military Possibilities (Plates 1, 2 and 3) ... 132
A chart of Delaware Bay and river 172
A map of Philadelphia 172
The Artillery at Dargai (Plates 1, 2 and 3) 178
Manœuvres of the XIV. German Army Corps, 1897 (maps 1 and 2) ... 200
The Mechanism of Bicycles. (Diagrams "F" "G" and "H") 412
A sketch of the action of the 15th December, 1778, between the French and English fleets 438
Appendix.—Species of stores 438
Plan of St. Lucia in the West Indies 500
Diagram showing curves obtained by plotting perforations 556
Map of country north of Poona 582



LIEUT.COLONEL FRANCIS DOWNMAN, ROYAL ARTILLERY.

JAN 24 1898
U. S. PATENT OFFICE

THE SERVICES

OF

LIEUT.-COLONEL FRANCIS DOWNMAN, R.A.,

IN

FRANCE, NORTH AMERICA, AND THE WEST INDIES, BETWEEN THE YEARS 1758 AND 1784.

EDITED BY

COLONEL F. A. WHINYATES, *late* R.H.A.

INTRODUCTION.

THE personal experiences of an officer of the Royal Artillery in campaigns of more than 100 years ago may, it is thought, prove of value to historical students of the present day. The services of Lieut.-Colonel Downman were of a most varied character, both by land and water, for though a soldier by profession, it is singular how much he was associated with naval affairs. Before entering upon the narratives he has left, it will be interesting to give some particulars concerning him and his family.

Francis Downman was the second of the four sons of Francis Downman, of St. Neots, Huntingdonshire, Esq., a lawyer by profession, whose father, Hugh Downman, in the early part of the eighteenth century, was Master of the House of Ordnance at Sheerness, where he died in 1728. The writer of these diaries obtained a commission in the Royal Artillery at the age of fifteen years, and was almost immediately sent on active service. During his first tour of service in North America, he married at New York, May 27th, 1772, Jane, daughter of Francis Day, of Pontefract, Esq., by whom he had four daughters and one son, afterwards Sir Thomas Downman, K.C.B., Royal Artillery and father of Captain J. T. Downman, late 83rd Regiment and Captain G. Downman, late 66th Regiment, to whose kindness we are indebted for the use of their grandfather's papers. In the latter years of his life Lieut.-Colonel Downman drew up a summary of his services, which it may be as well to give, before entering upon the more detailed accounts he has left of some of the campaigns in which he bore a part. The summary is given as far as possible in Lieut.-Colonel Downman's own words, with only such alterations as may serve to make the meaning clearer and more connected. The detailed accounts of his active service it has been considered advisable to divide into separate parts according to the different campaigns and events described, and which are as follows :—

PART I.—The expedition to the West Indies and taking the island of Guadeloupe in 1759, and subsequent residence in the island.

PART II.—Campaigns in the American War of Independence, 1777–8.

PART III.—The capture of the island of St. Lucia in 1778, and subsequent evolutions of the English and French fleets.

LIEUT.-COLONEL F. DOWNMAN'S SUMMARY OF HIS SERVICES.

He received his commission as a fire-worker in the Royal Artillery on June 8th, 1757. During the summer he was encamped at Chatham, and in the winter he worked hard in the Laboratory at Woolwich in a canvas frock, marked No. 6 on the back; Lord George Sackville[1] frequently came to see the young subs at work.

In June, 1758, he was with the little army at that time annoying the coast of France, which landed at Cancale Bay, under command of the Duke of Marlborough.[2] He was employed in the burning and destruction of all the vessels and store houses at St. Malo.

In July, the whole army returned to England, and the Duke went with a portion to Germany. The remainder was placed under General Bligh and sailed again for the coast of France. In August, Lieut. Downman was ten days on shore at Cherbourg constantly employed in mining and destroying the bason and works there. In the further operations in September, he commanded the only two 6-pr. guns that landed with the army at St. Lunaire Bay, and marched to St. Cas, where he had the unhappiness to see so many gallant officers and men lost in the embarkation in the Bay of St. Cas.[3]

In November, he went with the army, under General Hobson, to the West Indies in the fleet commanded by Commodore Moore.

In January, 1759, he landed with the troops at Martinico. The army lost a number of foot soldiers and two field-pieces in the hurry of running away in the night. In the same month he was actively employed in the reduction of Guadeloupe, particularly with that part of the army under the command of two excellent officers, Brigadiers Clavering and Crump. General Hobson died, but three weeks afterwards the island struck its white rag to Clavering and Crump in the Capes Terre. Lieutenant Downman was ordered to remain in the island and did so till the peace of 1763, when he was at the occupation of Dominique and returned home in the December of that year. As soon as he shewed himself at Woolwich, he was ordered to prepare for service in America, but obtained leave of absence. In June, 1764, he went to New York and remained till November, when he was sent to the Gulf of Mexico to receive over that miserable place Pensacola,[1] from a few half starved Spaniards. He had the misfortune to be ordered to remain in this province, and did so until 1771. He was then ordered to St. Augustine in Florida and remained until January, 1772. In February, he went to New York and arrived after a dreadful passage. He returned to England in December.

---

[1] Lieut -General of the Ordnance.

[2] Charles, 2nd Duke, died 20th Nov., 1758, in Germany. He was Master-General of the Ordnance and Colonel of the Royal Regiment of Artillery.

[3] While the army was embarking on Sept. 11th, the French, who had collected a large force under the Duke d' Aguillon, attacked the English rear-guard of some 1500 men and inflicted a loss of over 700 officers and men killed, drowned and taken prisoners, including General Dury, who commanded.
See Major-General Bligh's despatch, September 13th, 1758.

After some service in Scotland, he was again ordered to America, reached New York in June, 1777, and joined the army under General Sir W^{m}. Howe. He was constantly employed from the landing at the head of the Elk river in August until the entrance into Philadelphia. He was engaged with and took the rebel frigate Delaware. He was the only English officer with the Hessian troops under Colonel Donop in the attack on the works at Red Bank in October. He was present at the taking and destruction of the works on Mud Island in November, for which he had the public thanks of the Commander-in-Chief. About this time he was taken very ill from excessive hard service in the Delaware and was obliged to go to New York in a hospital ship.

He remained in New York till October, 1778, then sailed with the army under General Grant for the West Indies, was much employed in the taking of St. Lucia and had thanks for his conduct. He remained at St. Lucia, except when visiting the other islands, until the peace of 1784.

Lieut. Downman has left no detailed account of his experiences in the expedition against the coast of France in 1758, beyond the reference to them in the general statement of his services. In further explanation we may, however, briefly state that owing to the French encroachments upon our possessions in North America, war broke out between the two nations in March, 1757, which, by the following year, had expanded to all parts of the world. In 1758, Mr. Pitt projected a series of descents upon the coast of France, the object of this one, as we learn from the articles of instruction being, "To carry a warm alarm along the coast of France and to make descents on any part or parts thereof, and attack any place that may be found practicable from the easternmost point of Normandy as far as Morlaix inclusive. And that the utmost endeavours be made to land at or near Cherbourg on the coast of Normandy and attack the batteries and town, and, if possible, demolish and destroy the port and bason, together with all ships, naval stores, and works, batteries, fortifications, arsenals and magazines, and effectually destroy the same." Though in the main the various expeditions successfully accomplished their instructions, yet in England the feeling was that these attacks were rather more of a buccaneering nature than the operations of legitimate warfare. Mr. Pitt therefore, abandoned further action of the kind and the successes about this time in America at Louisbourg, under General Wolfe, restored the tone of popular feeling and confidence in the Prime Minister.

---

[1] Florida was ceded to Great Britain at the peace in 1763, in exchange for Havana. Pensacola was head-quarters.

PART I.

The expedition to the West Indies and taking the Island of Guadeloupe in 1759, and subsequent residence in the island.

As Lieut. Downman only commences his diary from the point at which he himself participated in the operations in Guadeloupe, it is as well concisely to relate what had previously occurred. An expedition to act against the French West Indian Islands sailed from Spithead on Nov. 10th, 1758, and arrived off the Island of Martinico in January, 1759. The troops were landed on the 15th, but it was found that little of consequence could be effected without a probable loss to the land forces and the fleet, especially the latter, that might seriously prejudice the more important operations designed against Guadeloupe. The troops were therefore re-embarked by moonlight with some loss on January, 17th, and the expedition proceeded to Guadeloupe, where a landing was effected on the 23rd, and possession taken of part of that portion of the island called Basse Terre. After some delay owing to the absence of the English fleet in search of the French squadron, further operations were undertaken, and Lieut. Downman, in the following pages, narrates what he saw and his subsequent experiences in the island.

A journal commenced 20th April, 1759, and ended the 8th Oct., 1764.

Chapter I.

Action at St. Marie's. Cessation of arms. Surrender of the Island of Marie Galante. Brigadier Clavering's report. A description of Guadeloupe.

On the *20th April, 1759,* the army began their march towards St. Marie's, and I received orders to attend them with my two field-pieces. We met with very little to molest our progress till we arrived near St. Marie's. The enemy had thrown up a breastwork by the water side, at the only place where we could pass. I brought up my guns, and by two or three well-pointed shot drove the enemy from it, our troops at the same time penetrating through the wood, which the French thought impassable, and nearly getting into their rear before they retired. They ran with the utmost precipitation to the heights above St. Marie's, where they had very strong intrenchments and cannon. I had two of my detachment wounded at the breastwork, One of my shot had killed two of the French; as we passed the breastwork we saw them lying almost knocked to pieces. Our troops immediately attacked their works, and in a little time carried them with some loss. The enemy set the town on fire before they left it. We halted here this night.

April 21st.—I set fire to a quantity of powder the enemy had left in the upper battery. I gave orders to send one of my guns on board a sloop, and attended the army with the other. At about 2 o'clock we halted at a large plantation, belonging to M. Penel, one of the richest men in the island. We were now arrived in the Capes Terre, the most beautiful part of the whole island. While we were at this plantation a prodigious number of negroes, all belonging to M. Penel, came in from the country and surrendered. We are informed that he has 1500 of his own. We found here 6 cannon. We remained here for the night.

April 22nd.—At 10 o'clock in the morning the army proceeded to a place called Bois de bout, about 2 miles from M. Penel's, and drew up on a most delightful plain. A flag of truce came from the enemy to treat for a capitulation.

April 23rd.—General Barrington arrived from Petit Bourg.

April 26th.—A flag from the enemy. A cessation of arms agreed on.

April 29th.—In the afternoon I went with several others to a mountain, where we found a great number of French women. They had lived in this retreat for some time, and have not a man with them. No people could seem more happy than these at seeing us, for they knew by our venturing to come to them that the capitulation was near concluded. They seemed to have everything in plenty about them, and entertained us with coffee and chocolate. They live in huts, but the spot they have chosen is most beautifully romantic, on the very summit of a mountain. The ascent to it is very steep and rugged, but the top is level and entirely shaded from the sun by prodigious high trees whose tops touch each other, and prevent even a ray of the sun penetrating. In this delightful and pleasing spot their huts are built, and, setting aside the fear they must have for their fathers and husbands, they seem perfectly happy.

April 30th.—I was informed that two French men-of-war had got out of Fort Royal harbour in Martinique, given our active commodore the slip, landed 400 men at St. Ann's, and were landing 600 more, when they heard the island had capitulated. They immediately embarked them again, except some that took the opportunity of deserting.

May 1st.—The capitulation was signed.

May 2nd.—A detachment of 400 men under the command of Colonel Barlow marched this morning to take possession of the Dos d'ane, a mountain that lies between this place and Basse Terre, and which is the only pass to that town from Capes Terre. It is a place of such amazing strength, that a few men might maintain it against an army.

May 3rd.—I am informed that the commodore has let the French fleet out of Martinico, and that he is in pursuit of them *under easy sail.*

May 5th.—I went to a French battery on the road to the Dos d'ane called Les trois rivières, and knocked the trunnions off three iron guns. I found them loaded with two round shot and two bags of langrage each.

May 7th.—General Barrington has taken up his quarters at Monsieur Poyen's, a man of great property in this part of the island. The French ladies come in very fast.

May 11th.—General Clavering, Major Dundas and Captain Leslie sailed from here yesterday in a sloop to join the fleet, and then proceed with the express to England. Two hundred men marched from here to Mr. Heeds, about five miles off, with orders to remain there. The remainder of Elliot's regiment marched back to M. Penel's.

May 12th.—It was in orders that the troops should receive the same allowance of provisions as the King allows in the garrison of Gibraltar.

May 14th.—A detachment marched in here from Les trois rivières under command of Major Teesdale.

May 16th.—The army marched from here to St. Marie's to embark for the Island of Marie Galante, a French island which lies within sight. I am now left at this place alone.

May 18th and 19th.—I heard a great deal of firing towards Marie Galante, which made me imagine our troops had landed.

May 24th.—I was informed the Island of Marie Galante had surrendered. I now received orders to march from this place to Petit Bourg, where I am to be quartered. The company of artillery I belonged to has received orders to remain in this island, as have likewise the 4th, 63rd and 65th regiments. I am appointed to Petit Bourg with 20 men; the 4th regiment is quartered in the village, and by General Crump's being here, it is head-quarters. The 63rd regiment and a detachment of artillery with Lieutenants Patrickson[1] and Young[2] are stationed at Fort Royal, and the 65th regiment is appointed to Grand Terre.

It is not easily conceived what hardships and difficulties the troops have gone through that were employed upon this service, viz., the want of provisions, crossing of rivers, climbing of precipices, lying on the bare ground in wet clothes, excessive heat of the climate, and many other things which sufficiently shew the goodness and bravery of our troops and the skill and perseverance of our leaders. For my own part I believe I fared as badly as any soldier in the army. Very often indeed have I been obliged to be content with a small piece of salt pork or beef and a biscuit and a draught of water. Fresh meat on the march was the greatest rarity. I did not from the day of my landing till I returned to Petit Bourg but once lie up on a bed. Every night my mattress was the bare ground or the leaves of the sugar cane, and yet notwithstanding I never had the smallest illness, though others were attacked with many disorders. The flux was the most fatal, for in a few days it generally carried off the person who was seized with it. During these operations we took 45 pieces of artillery, which had they been defended with any spirit must have done great damage to our army.

Before I proceed further with my journal, I will insert the letter written by Brigadier-General Clavering describing our operations.

At Monsieur Poyen's,
Capes Terre, Guadeloupe,
April 24th, 1759.

Sir,

On Thursday, April 12th, at daybreak, I landed with the troops which you put under my orders, consisting of 1300 men, exclusive of the Antigua volunteers, at a bay not far distant from Arnoville. The enemy made no opposition to our landing, but retired as our troops advanced to very strong entrenchments behind the river Le Corn, This post was of the utmost importance to them, as it covered the whole country to the Bay of Mahault, where the provisions and supplies for the whole place were landed from St. Eustatius, and therefore they had very early taken possession of it, and had spared no pains to strengthen it, though the situation was such as required little assistance from art.

The river was only accessible at two narrow passes, on account of a morass covered with mangroves, and those places they had occupied with a redoubt and well palisaded entrenchments defended with cannon and all the militia of that part of the country. We could only approach them in a very contracted front, which was at last reduced to the breadth of the roads, intersected with deep and wide ditches. Our artillery, which consisted of four field-pieces and two howitzers, were ordered to keep a constant fire on the top of the entrenchments to cover the attack made by Duroure's regiment and the Highlanders, who, on this occasion, behaved with the greatest coolness and resolution, keeping up as they advanced a regular platoon firing. This behaviour so intimidated the enemy that they abandoned the first entrenchment on the left, into which the Highlanders threw themselves sword in hand and with part of Duroure's regiment pursued the enemy into the redoubt. The enemy still kept their ground at their entrenchments on the right, from whence they annoyed our people very much both with musketry and cannon, and though those who had carried the first entrenchment had got into their rear, yet, till a bridge could be made to pass the river, they could not get round to attack this post. This took us nearly half an hour, but however, we got time enough to take nearly 70 of the enemy prisoners as they were endeavouring to make their escape, amongst whom were some of the most considerable men in the island. We found in both the entrenchments six pieces of cannon. Our loss was one officer and 13 men killed, and two officers and 52 men wounded.

---

[1] Kane's List, No. 254.

[2] Kane's List, No. 304.

As soon as the ditches could be filled up for the passage of the artillery, we proceeded on our march towards Petit Bourg. A considerable number of the enemy had lined an entrenchment about half a mile on the left of the road, but when they perceived we were endeavouring to surround them, they abandoned it, keeping always about 200 yards in our front and setting fire to the sugar canes, which obliged us more than once to leave the road to avoid any accident to our powder.

The troops arrived late on the banks of the river Lezard, behind which, at the only ford, the enemy had thrown up very strong entrenchments, protected with four pieces of cannon on the hill behind them. Having reconnoitred the side of the river, and finding it might cost us dear to force the passage at the ford, I therefore kept up the enemy's attention all night by firing into their lines. During this time I got two canoes conveyed about a mile and a half down the river, where being launched, we ferried over, before break of day in the morning, a sufficient number of men to attack them in flank, whilst we should do the same in front. The enemy soon perceived their danger, and left their entrenchments with the greatest precipitation.

Thus we passed without the loss of a man, still pursuing them to Petit Bourg, which place they had fortified with lines and a redoubt filled with cannon.

We found Captain Uvedale there in the *Granada* bomb, throwing shells into the redoubt. The enemy did not remain in it long, when they saw our intention of occupying the heights around them, but left us masters of that and the port, and all the cannon round the place. We halted here the 14th to get provisions for the troops.

On the 15th, at daybreak, Brigadier Crump was detached with 700 men to the Bay of Mahault, and at the same time Captain Stiel with 100 to Guoyave, about 7 miles in our front, to destroy a battery there. The panic of the enemy was such that they only discharged their cannon at him, and abandoned a post that might have been defended against an army. He nailed up 7 pieces of cannon and returned the same evening to Petit Bourg; Brigadier Crump returned likewise the next day with his detachment from Mahault Bay, where he found the town and batteries abandoned. These he burnt with an immense quantity of provisions that had been landed there by the Dutch, and reduced the whole country as far as Petit Bourg.

The heavy rains on the succeeding days had so swelled the rivers, that it was impossible for the troops to advance; however, this delay gave us an opportunity of strengthening the post of Petit Bourg.

On the 18th, in the evening, the Antigua volunteers took possession again of Gouyave. They were supported the next morning by a detachment commanded by Colonel Barlow, who had orders to repair the roads for the cannon.

On the 20th, after leaving 250 men to guard Petit Bourg, the remaining part of the detachment, with two field-pieces, moved on towards Gouyave, in order to proceed afterwards to St. Marie's, where we were informed the enemy were collecting their whole force to oppose us, and had likewise thrown up entrenchments and made barricades on the road to prevent our approach to it. We were not long before we perceived them; but at the same time we found by our own observation, as well as by the information of the guides, that it was not impossible to get into their rear by roads the enemy thought impracticable, and consequently had guarded with little care.

A detachment was immediately formed under Colonel Barlow for this service, and orders were sent to hasten the march of the artillery, which from the badness of the roads had not been able to get up. The first shot from our cannon, placed very near their entrenchment, together with the alarm that was given by our detachment in the rear, made the enemy very soon sensible of the dangerous situation they were in; and indeed, only their precipitate flight saved them from being all taken prisoners. We pursued them as far as the heights of St. Marie's, where we again formed our men for a fresh attack on the lines and batteries there.

Whilst the barricades were being levelled for the artillery, we attempted a second time to pass the woods and precipices that covered the flanks of the enemy's lines, but before we could get up our cannon they perceived our intention, and began to quit their lines to oppose it, which made us resolve, without any further delay, to attack them immediately in front, and this movement was accordingly executed with the greatest vivacity, notwithstanding the constant firing of both their cannon and musketry. They abandoned here all their artillery, and went off in so much confusion, that they never afterwards appeared before us. We took up our quarters at St. Marie's that night, and the next day entered Capes Terre, which is the richest and most beautiful part of this or any other country in the West Indies. Eight hundred and seventy negroes belonging to one owner surrendered to-day.

Here Messrs. de Glainvilliers and Duqueruy, deputed by the principal inhabitants of the island, met me to know the terms you would grant them, and, as I accompanied them to Petit Bourg the next day and there presented them to you, it is not necessary for me to mention any transaction since that time.

I cannot, however, conclude without doing justice to those to whose merit is due the success that has attended the King's Arms on this occasion, to the troops who displayed so much spirit and constancy, to Brigadier Crump, without whose concurrence I never undertook anything, but chiefly to yourself, Sir, who planned the whole enterprise and who furnished me with those means, without which bravery or prudence can little avail.

To
I have the honour, etc., etc.,

The Hon. General Barrington.
J. Clavering.

I have already said that I was ordered to remain at Petit Bourg with 20 artillerymen. The first six or seven months I kept my health exceedingly well, having not the least complaint, though living entirely on salt provisions and without vegetables, but the 4th regiment and my detachment were not so fortunate. A fever and fluxes got among them and carried them off with the most unrelenting hand; 12 or 14 men have I seen carried to the burying ground of a day, and many of the officers likewise died in this place. The regiment, before a twelve month was elapsed, were near all dead or sick. I have been on the parade when they could not show above 20 men. For a considerable time our drummer marched off and trooped home the guard. I lost out of my detachment 16 men, yet during this dreadful mortality I continued quite well for six or seven months. At last I was seized with a violent fever one day when out shooting, and so severely that with great difficulty I reached home. This continued upon me for some considerable time, but intermitted. All this time I had nothing to live on but salt provisions, the few fowls that were to be had being at such a monstrous price that it was out of my power to buy any, and on getting over the fit I was very happy that I had a piece of salt pork and callivances (a kind of pea) to eat.

The town of Petit Bourg is most vilely situated, for in the front of it are many little islands swampy and covered with mangroves. A vast number of dead bodies were thrown ashore on them during the armies being at St. Louis. The wind comes from the sea over these islands and blows directly upon the town, and at the back is a vast quagmire perpetually exhaling pernicious vapours. On the right and left are two hills which almost prevent any wind from coming into the town. For what reason such a place should be chosen for head-quarters is hard to determine. During my abode in this miserable place I felt three earthquakes. The first one happened about 8 o'clock in the evening, after a calm and intensely hot day. I was quartered in a large old house, and every instant expected it to fall upon me. The moment before we felt the shock, a most tremendous noise was heard, resembling the noise of a large body of horse, or coaches, galloping down a hard road. On my first feeling it I was struck motionless, and did not make the least attempt to run out of the house; indeed the Lisbon earthquake came to my memory and I expected every moment to be swallowed up. My fusee and other things that were hanging up in the room all came tumbling about my ears, and so froze me with fear that I remained in my chair till it was all over. No other damage happened from this shock (which lasted about a minute and a half) than a few old houses being thrown down.

It was not long after this when we were attacked with another, but it was nothing equal to the first. The third happened when I was dining on board a vessel in the harbour. The shock we received was just as if the vessel was driven from her anchor and had run violently upon a rock. The master was frightened and exclaimed "By G——d we have got among the rocks," but running upon deck he soon found what it was, for all the people of the town had run from their houses into the street.

After I had been at Petit Bourg about a year, I got leave to go on a visit to Basse Terre. I had not been long here when I was again seized with the fever and ague, and was more than once given over, but being at this time blessed with a good constitution I recovered perfectly, and during the remainder of my residence in this island had not the smallest illness. While I was ill here, Lieut. Young was sent to Petit Bourg in my stead.

I went from Petit Bourg to Basse Terre (by land, passed through that beautiful part, Capes Terre, which was by this time quite recovered from the devastation we had made. The plantations were again flourishing, and each of them seemed a little village, from the number of slaves the planters possessed. They had now an English market to take their produce to, and every one of them was amassing a fortune. This part of the island is inhabited only by Protestants, and they maintain a clergyman for themselves, taking it alternately to have service in one of their houses where they dine and pass the remainder of the day. I have often had the pleasure of being with them, and always met with the greatest civility and politeness. When I left this enchanting place, I found the remainder of the road very rough and bad, being principally over rocks and deep gullies which are dreadful to look at. The Dos.d'ane, or asses back, is so very steep in its ascent and descent that the greatest care must be observed to prevent your falling. This place must be impassable to troops if the smallest opposition is made, for even rolling stones down it would be sufficient to prevent their approach without making use of any other weapon.

I do not think it will be amiss, in the plan of my journal, to give some account of Guadeloupe, as well as I can from my own observations.

I was a resident in it from the time of its being taken to the giving up.

The island is called Guadeloupe from a resemblance which it bears to a chain of mountains of the same name in old Spain. To speak with exactness, it is rather to be considered as two islands, divided from each other by a small river, called the Salt river, which I have twice been through. It is deep enough to admit pretty large vessels, but the water at the two entrances is not so deep as when you are in, and the greatest width is not more than 100 yards at the widest place. One of these islands is called Grand Terre, the other Guadeloupe, they are together in a circle about 90 leagues. The first is nearly destitute of fresh water, and not perfectly cultivated, but it is otherwise with Guadeloupe. No part of the world is furnished with more or better water, for no less than 50 rivers in that small circuit empty themselves into the sea, many navigable by boats, not to mention the numberless springs which rise among the rocks, and after a thousand meanders lose themselves in the larger streams. I wish I was able to describe the beauties of this country as they deserve. No part of the West Indies, perhaps of the world, affords more agreeable and more romantic scenes. It is full of high mountains, from which torrents of water are seen falling from rock to rock till lost in some profound gorge. I have often been in these places, and cannot imagine anything half so tremendous and yet so enchantingly agreeable. You are obliged to step from rock to rock, between which the water in some places is deep, and here are to be caught the finest shrimps and crawfish. Being in these ravines is being in another climate. The trees on the edges of the precipice are so intertwined together that the sun cannot penetrate, which makes it most delightfully pleasant. On the mountains a great variety of birds are to be met with, and very good of their kind, so that any person fond of romantic scenes and rural amusement, may in the highest perfection enjoy them in this country. There is one very high mountain not far from Basse Terre, which towers above the clouds, and a volcano continually emitting smoke and fire. From this mountain considerable quantities of sulphur may be had; with several of our officers I went up as far as we could with safety, and found at a considerable distance from the great mouth a vast quantity of sulphur in lumps and in powder, and large cinders had also rolled a great way down the side of the hill. We found it extremely dangerous after we were a good way advanced, not only from the difficulty of climbing up, which we could only do by depending on small burnt up shrubs and protecting rocks, but also from the number of holes in the side of the mountain, which seemed to have no bottom, and made one shudder to go near them.

To the northward of Basse Terre, near the river Bouillante, are hot baths fit for all medicinal purposes for which such waters are used. The land in the valleys is extremely fertile, it produces the usual West Indian commodities, sugar, indigo, coffee, cotton, and ginger, with a variety of fruits, and the most of them very grateful to the taste. The pine apple of this island grows to a prodigious size, and is of the most delicious flavour, far surpassing anything I ever tasted in any other part of the world.

The French began to plant colonies in this island as early as the year 1632. But for a long time this, together with all their colonies, continued in a languishing condition. It was in the beginning of the present century that they began to emerge from their depression. After the peace of Utrecht had given France time to breathe, she turned her attention strongly to these islands. Guadeloupe partook however less of this care than Martinico, and yet, by its natural advantages it does not fall short of that island, either in the quantity or goodness of its produce, if it does not greatly exceed it in both, as it certainly does in its capacity to receive all sorts of improvement. The importance of this island until its conquest was very little known in England. The reason was that, by an old and very extraordinary regulation, the people of Guadeloupe were forbid to trade direct with Europe, but were obliged to send all their produce to Martinique, from whence they had all their European commodities! The change they now experience is so pleasing to them that they heartily wish the English may ever remain masters, for they are certain of being again loaded with this heavy imposition when the island is restored to France. They have now the satisfaction of disposing of their goods to whom they please, they are always sure of a market, and the whole country seems to have received new vigour from its late distress. The sides of the hills and mountains, that before never felt the hand of the husban-d man, are now cleared and cultivated. By this happy change of government every planter is amassing a fortune.

The English made attempts on this island in 1691 and 1703, but they were neither powerful enough, nor conducted with sufficient ability to produce any permanent effect; the troops wasted the country and retired with their booty.

BRITISH GUNNERS AT THE SIEGE AND BATTLE OF NARVA IN 1700.

BY

CHARLES DALTON, ESQ.

(Editor of "English Army Lists and Commission Registers, 1661–1714.")

WHEN Peter the Great elected to take up his residence at Deptford in February 1698, with a view to learning the art of shipbuilding, Sayes Court, which belonged to John Evelyn, was taken for the Tsar by William III. in consequence of its vicinity to the Royal dock-yard. It was at this house, which was newly furnished by the King, that Peter, who infinately preferred the aristocracy of talent to the aristocracy of birth, entertained all sorts and conditions of men. "There is a house full of people and right nasty," wrote Evelyn's servant to his honoured master soon after the Tsar's arrival at Sayes Court.[1] But Peter had not come to England solely to learn ship-building. He was bent on impressing teachers of mathematics, experienced artillerists, engineers, ship-wrights and skilled artificers for service in Russia. The peace of Ryswick, with its all round reductions, having thrown many out of active employment, Peter and his agents found little difficulty in getting hold of the kind of men they required. Deptford supplied some experienced hands and Woolwich Arsenal, (which the Tsar visited), provided others. After visiting Portsmouth we are told that Peter signed contracts with about sixty men, many of whom had been recommended by Lord Caermarthen.[2]

The chief of these was Major Leonard van der Stamm who, though a Dutchman by birth, had served with the British Artillery Train during the Irish campaign of 1691, and at the battle of Landen in 1693 where he commanded a company of artillery. From 1693 to 1697 he had served uninterruptedly in Flanders. The transfer of this able and gallant officer to the Russian Service was an undoubted loss to the British Artillery but, curious to say, it was not his knowledge of gunnery which procured him a high post in Russia, but on account of his being a "specialist in ship designing."[3] The Tsar also engaged the services of several experienced gunners who were sent to Russia in the spring of 1698. The names of four of these artillerymen have been handed down to us and their names and services deserve to be perpetuated. They were, Abraham Kennesby who served as gunner in the Descent Train, A.D. 1692-3, bombardier in the Sea Train, 1694-5, and fireworker in the Newfoundland Train, 1696; William Stokes gunner in the Flanders Train from the 15th of Sept. 1693 to the time of the Peace; Archibald Crosier gunner in the Flanders Train from the 15th of Aug. 1693 to the time of the Peace; and Thos. Lambert bombardier in the late Flanders Train.[1] It is probable that these four gunners were attached to Peter's own company of Bombardiers which, if we may judge from the lamentable state of inefficiency of the Russian Artillery, under the command of Prince Alexander of Imeritia, before Narva in 1700, was in no way superior to the "pleasure" regiments with which Peter amused himself in mimic warfare at this early period of his eventful career.

---

[1] Evelyn's *Diary*, Vol. II, p. 349.

[2] Schuyler's *Peter the Great*, Vol. I, p. 368.

[3] Schuyler's *Peter the Great*, Vol. I, p. 368.

War having been declared by Russia against Sweden on 8th Aug. 1700,[2] an army numbering nearly 40,000 men was sent to reduce Narva, a strongly fortified town in the Swedish province of Livonia and situated on the right bank of the river Narova. We are told that Peter started off gaily from his capital at the head of his Bombardier Company, which accompanied the vanguard of his army, "full of expectation of an easy victory."[3] On the 23rd Sept. Peter arrived at Narva and found the place in a good state of defence and only to be taken by a regular siege for which little or no preparation had been made. The fortress was well armed, but the garrison was small consisting of 1,300 infantry, 200 cavalry and about 400 armed citizens. Owing to insufficient transport, and the awful state of the roads, the main portion of the army did not reach Narva until 18th October and the troops were in a very exhausted state from the privations encountered on the march. The Russian line of circumvallation, which was entirely on the left or western side of the river, was about seven miles in length.

Earthworks were also thrown up opposite to the castle of Ivangorod which was connected with the fortress by a good stone bridge and formed part of the defences of the town. The bombardment began on 20th, October, from eight batteries on the Narva side and also from the trenches in front of Ivangorod. We are told that the artillery fire continued day and night for two weeks without success. The gun-carriages had been so knocked about by transportation that they "usually fell to pieces after three or four discharges.!" The Russians were constantly harrassed by sorties from the town. On 6th November the ammunition ran short and the bombardment had to cease the following day until new supplies were brought from Novgorod. News also shortly reached the Russian camp that Charles XII. was on his way to relieve the town and would be at Narva within twenty-four hours. At this crisis the Tsar thought fit to leave his army and go to Novgorod. One of Peter's biographers and apologists says the Tsar went to hurry up ammunition and reinforcements; and also to interview the King of Poland and decide on the future conduct of the war. The same apologist

---

[1] Ordnance Warrants. Vol. 48, fol. 103

[2] Old Style.

[3] K. Waliszewski's *Peter the Great*, English edition, translated from the French.

(Dr. Schuyler) says that neither Peter nor those about him appreciated the rapidity of the Swedish movements under Charles, and that they expected the siege would still be going on when Peter should return. Be this as it may, the Tsar's desertion of his army in the hour of danger had the worst consequences. Peter entrusted the command to the Prince de Croy who had fought with distinction in the Austrian Service but was totally unacquainted with Russian troops and knew little of their language. Within twenty-four hours of Peter's departure the Swedish army, numbering about 8,000 men, after four days' forced marching, reached the pass of Pyhajoggi which, if fortified, would have held any army in check. But owing to Peter's obstinate refusal, at an earlier date, to allow this pass to be fortified, the Swedes easily drove back the few troops sent to guard the defile and Charles swept down on the Russian camp. The result is well known, confusion and panic ensued. The Russians raised the cuckoo cry of "We are betrayed by the foreigners" and several of their officers were killed. The cavalry bolted and many men and horses were drowned in crossing the Narova river, the bridge breaking down. The two Regiments of Russian Guards, which were protecting the artillery park, stood their ground at first but the Prince de Croy, and the other generals, being quite unable to allay the panic and restore order made their way to the Swedish lines and surrendered. The Russian loss was estimated at 5,700 men. Seventy-nine officers, including nine generals, were taken prisoners and the Swedes captured, in addition, 149 cannon and 32 mortars.[1] How the Swedes treated their unhappy prisoners is best told in the following sorrowful petition:—

"To ye Right hon'ble Henry Earle of Romney, Mast'r "Generall of his Ma'ties Ordnance.[2]

"The humble Petition of Abra. Kennesby, Fireworker, etc. William "Stokes, and Archibald Crosier, Bombardiers, Subjects of his Sacred "Ma'tie of Gt. Brittaine etc. now miserably distressed Prisoners at "Stockholm in Sweden.

"Most humbly shewing, That your said Petitioners having faithfully "served his Ma'tie Our most gracious King for some years in ye late "Warrs in Brabant after ye Peace concluded, anno 1697, were permitted, and thereupon stipulated to serve ye Czar Majestie of Muscovie "unto which place we were, anno 1698, transported where faithfully, "not without good acceptations, we performed our duty untill ye 20th "of November 1700; that at ye seige and battle before Nerve *(sic)* we "with others were taken Prisoners, stripped of our cloths, destitute of "money, from thence sent to ye common close prison at Revall, thus "miserable, naked, and poor, not having to sustain our life save what "charitable people moved with our grones and dolefull cries were for "six months time (moved to preserve us alive) bestowed on us; one of "our companions, Thomas Lambert a bombardier, perishing in this deplorable condition,—the Muscovite Generall, the Hnees *(sic)* Lord

---

[1] The above account of the siege and battle of Narva is partly taken from Dr. Schuyler's and partly from Waliszewski's narratives.

[2] Ordnance Warrants, Vol. 48, fol. 103.

"Dolgoruiky, and Lt. Generall Weide, both at Revall and here, upon "our humble addresses remonstrating our condition, have denied to us "any manner of reliefe, or any of our pay due to us, we having full 500 "R. Dolrs. due to us, the said Generalls having received large remises, "and relieved and dayly pay out to divers prisoners, but told us at "Revall during our six months miserable imprisonment, as they to this "day tell us, during our prison here, that they have not received any "money to pay us; in such a miserable condition of 10 months imprison-"ment, our soe suffering makes us beyond all expression sadly ye objects "of good men's comiseration. We ye said Prisoners from ye Depth of "our present misery most humbly beg That it may please y'r Exc'cy, of "your Innate Clemency, to lay to heart the true Cognizance of ye "Premises. and our deplorable imprisonment in a strange Country, "suffering hunger, cold, and nakedness, and that we may be released, "and returne to our pristine service, and we shall as redeemed from "Death ever pray, and devote our own lives unto your Exc'cys service.

"Abra. Kennesbe.

"William Stokes.

"Archbald Croser.

"Stockholm, 24th of September 1701."

Certain Russian prisoners were liberated by exchange, in 1709, when the victory ot Pultava established the ascendency of Peter over his rival Charles XII, but numbers remained prisoners twelve years longer. By that time very many of these unhappy men, including the Prince de Croy who died a pauper prisoner at Reval in 1702, had paid the debt of nature. It was a case of "survival to the fittest" It has not yet been ascertained when Abraham Kennesby returned to England, but it is apparent that when he did so he virtually had to begin his military career over again. On 1st August 1720 he was appointed Fireworker in the Royal Artillery, and in 1729 was promoted 2nd. Lieut.[1] In the latter year Kennesby was commanding the small establishment of Artillery at Placentia with pay at *three shillings per diem.*[2] When we remember that in 1696 Kennesby received five shillings per diem as Fireworker in Newfoundland, it is sickening to find that more than a quarter of a century later this old officer, with increased rank, should be receiving only three shillings—a pittance barely sufficient to keep body and soul together during the bitter winters in Newfoundland. According to "*Kane's List,*" Lieut. Kennesby died in 1731 and for want of a better epitaph let the following suffice:—

"HE WAS GRIT."

---

[1] *Kane's List*, p. 1.

[2] *Cleaveland Notes*, p. 211.

A FEW PLAIN REMARKS
ON THE
POSITIONS AND WORK OF THE ARTILLERY IN THE FIELD.

BY

BRIGADIER-GENERAL C. H. SPRAGGE,
Commanding Royal Artillery Bombay Army.

(A Lecture delivered at the Royal Artillery Theatre, Kirkee, 16th June, 1897.)

During the past drill season it has fallen to my lot to be present at a large number of Artillery Camps, and to see a great deal of the working of the various Batteries in this Command, both singly and collectively.

It is an opportunity such as falls to the lot of few of us. Lookers-on proverbially see most of the game, and I can only wish that it had come to me earlier in my service, as had it done so, I should have avoided many many errors which I fell into during the time I commanded a Battery and Brigade Division.

With a view to helping those who have not such opportunities, I have thought that a few general remarks might be of use, as showing the light in which the various phases of Artillery work appeared to me. I have endeavoured to avoid details as much as possible, and to deal generally with the broader views of Artillery work in the field.

In thinking over the remarks that I made on the many tactical field days that were carried out at our Practice Camps, I have sometimes been tempted to tax myself with inconsistency, in that I find myself condemning, here the man who screened his guns, there the one who exposed them—first, the one who was too slow, and even once the man who was too fast. I therefore took my remarks in detail, carrying, as far as possible, in mind's eye, the positions themselves, the circumstances under which they were taken up, and the general conformations of the country, and, having done this came to the conclusion that my decisions were in the main correct.

I do not say this in the least to justify myself, but only to accentuate the fact which cannot be too strongly or too often drummed into all concerned, that it is impossible to lay down hard and fast rules as to whether the forward or the concealed position is to be adopted, until the position be reconnoitred. It is all a matter of ground and circumstance.

In coming on to a position one of our great faults is very often a lack of method.

It is very difficult to combine rapidity of movement with getting the guns into the right positions, and we have not mended matters by giving up many useful old parade movements. I don't believe it was ever intended that we should, but some Officers have jumped at it and given up parade movements to a dangerous extent.

Depend upon it, no large body of Artillery, any more than any other troops, can manœuvre in the field without confusion unless the units (Batteries and Brigades), as well as the individual men and horses, are *thoroughly* under the control of their immediate leaders.

This *can* only be attained by careful instruction and *steady drill.*

A certain school of Officers are apt to say now-a-days Barrack square drill is waste of time! And certainly of late years the evolutions of the Drill Book have been much curtailed, and with advantage. But the more accurately intervals, distances, dressing, and pace are observed, the easier is it to direct manœuvres, and the less likelihood is there of confusion or misunderstanding arising.

With *sloppy* drill, no commander is ever safe, the consequence being that *he is bound* to feel nervous. He never knows for certain how his batteries are coming up, whilst, on the other hand, if he feels sure that their drill is what it should be, he can go on with his legitimate work with a light heart, contenting himself with giving his directions broadly knowing that the units won't put him "in a hole"; that he can trust to his subordinate leaders, and not bother himself with minor details.

The combination of rapidity and exactness comes from an instinctive knowledge (so to speak), of what has to be done, running through the whole system—through Majors, Subalterns, Sergeants, Drivers, Gunners, and all. How often has one seen a battery excellently brought into a Heaven-born position, and some gun comes lumbering up, too far, too much to the right or left, and the whole thing is spoiled! Yes—And 'spoiling' at a field-day may mean on service "giving away" the whole position to the enemy, and all because somebody's "Artillery instinct" failed him at an important moment. It is not only the Major that must have his eye for the whole Battery, but the Subaltern for his section, the Sergeant for his gun, and that not selfishly, but ever having regard to his "right and left neighbours."

Formation—

Line is our fighting formation. We can't have that too strongly impressed on our minds! It should be adopted in the presence of the enemy *Whenever the ground admits.*

Column is only used—

(*a*) For flank movements,
(*b*) To pass obstacles, or
(*c*) For the sake of advancing to a position under cover, when an advance in line would discover what we intended doing to our opponents.

Artillery should therefore habituate itself to forming line from column and *vice versâ* with *unhesitating celerity,* and this can only be done by leaders grasping the situation, and by their subordinates knowing what to expect, viz.—that on every possible occasion, and as soon as opportunity offers, line formation will be maintained. A clock-work sort of business with which Lieutenant-Colonels should seldom have to interfere.

All manner of arguments and possibilities have been threshed out in the Institution papers and the various drill books, &c., and as there is "nothing new under the sun," I hope if you find in my remarks what has been said in one or the other publication you will understand that I am only going over old ground in the hope of catching the attention of some one who has not read so carefully as you yourself have.

The whole question of positions is, of course, *where to go* and *how to get there.*

Where to go.—Well, undoubtedly the first consideration is to get to a place from which you can see, either with your own eyes or by means of the instruments with which a battery is provided.

How much should be seen to ensure effect ?

A good general view.—You can't expect impossibilities ; you can't expect to find, in ordinary country, ground sloping down like a long glacis in front of the position. But you should have a good *general* view of the ground where the enemy's guns are likely to be, and the ground over which his infantry are most likely to advance.

No doubt you will say that is self-evident. Well, it is ; but how often is it needlessly neglected. Over and over again have I seen batteries brought up on to a position which did *not* fulfil these conditions, when a little to right or left, back or front, there was one which did.

The question of *cover,* and the best position for guns to obtain the *greatest immunity from casualties combined with effective shooting,* has occupied our minds ever since we thought about such things.

We are told that the Germans do this, the French do that, and so on ; but I think, we must remember—

1st.—We are never likely to have to deal with such enormous masses of artillery as those nations employed in their last war one with another.

2nd.—That their last practical experience was some quarter of a century ago.

3rd.—I really think we know quite as much about it as they do !

The best cover is such a formation of ground as renders it most difficult for the enemy's guns to range on you. A dip in front, to hide the burst of such shells as are short, one behind to hide those that are over will give him a bad target to range on.

I do not consider that we give half enough consideration to *back ground,* and its importance will be more than ever brought out when we have cordite. There will then be nothing to discover the position of a battery in action, save the carriages and the personnel, and if any man doubts how difficult it is to pick up such a target, let him only try and do so on a battery, say, in bracken or shrub, with a good back ground thrown in, if possible, at two or three thousand yards.

In remarking on a battery's conduct at one field day, I said, in speaking of a position taken up on a bare hill side (Position A), "two hundred yards to the left would have been better." The Major afterwards asked me why, saying he thought there was "no difference." I told him that the reason was that, in the position I advocated, he would find a *background of dark scrub or trees* (I forget which) (position B). He told me afterwards that, to make sure, he had on a subsequent day gone to the target, and had his battery placed just in the position he had taken up, and then in the position which I had advocated, further down the ridge; and that whilst *he could* see his guns in the first, he could not see them at all in the second. I need hardly say that the ground had been well reconnoitred by me previously, but, of course, *he* should have done the same before taking up his position with his battery.

When it comes to *actual cover*, nothing is gained by hugging it,—better, if possible, go two or three hundred yards *behind it.* The 'cover' may often be a good object for the enemy to range on. Here, again, I will give you an example. I ordered a C.O. to bring his battery on a position something like this in section. He with great pains brought them close up to A, and it was only with great difficulty I could get him to see that B was a much better position. He wanted the cover given at A, which he really got much better some 200 yards further back at B. He, by the way, was wrong in every way; he could have got to B under cover, whereas he came right over the hill at the back. Further, at A all his guns when fired ran back into a small nullah in rear of the position and had to be got up to their original position with much labour after every round.

A most important question which every officer should ask himself is, "what am I taking up the position for" and "what future action will most probably be required of me?" Are we—

(*a*) Attacking guns already in position with a view to covering an infantry attack?

(*b*) Pursuing a retreating enemy?

(*c*) Resisting an attack? or

(*d*) Covering our own retreat?

Further, what is the morale of the troops against which we are acting?

(*a*) *Guns already in position.*—In this case I should, if possible, make use of the concealed position (laying by means of pickets). It offers enormous advantages in the saving of men and material and in the matter of accuracy of practice. The great objection is that the objective cannot so easily be changed, also that cavalry can advance under cover up to the crest line in front of the battery. But the first and most prominent fact that strikes one is that in many cases it is the only one position possible. I do not think that it would be possible (certainly not without frightful loss) to bring a battery into action in the open against artillery already in position that knows its range. I am speaking, of course, of modern skilled artillery. The experience of the Franco-German war showed that whole batteries were wiped out whilst attempting to come into action within sight of the enemy's guns that were already in position.

Failing the concealed position.—The thing a battery has to depend on is *pace*, and knowing the difficulty there is in making good practice on a rapidly moving target, I think that, under favourable circumstances, a rapid gallop up to a position over the last few hundred yards would probably save many a gun, especially if the battery be launched from a well concealed starting point. But, taken at the best, with an observant enemy it is a very difficult and dangerous operation. Once committed to it, there is *no withdrawal*. If the position has been reconnoitred the enemy has probably observed the party who went forward to do so, and arranged accordingly, and if it has not been reconnoitred, the probability is that it will prove disappointing—perhaps untenable.

As to the *drawbacks of the concealed position*. If the objective has to be changed on to artillery in another position, nothing surely is easier than to relay aiming posts. And supposing the enemy's guns to be silenced, or should there be reason so to do, the guns can be run up by hand into a more forward position whence the front can be more easily seen.

The concealed position has a rôle of its own, and is, under certain aspects, most useful, and, I may say, indispensable; but no artilleryman can consider it suitable for *every phase*, and it is astonishing to me to hear men speak as if its advocates ever endeavoured to argue that it *was*. Of one thing I am sure, that it wants much practice and that many batteries don't practice it half enough. The difference shown by the batteries in this command in making use of it left no doubt in my mind as to who had and who had not.

In supporting the *infantry attack* it must be borne in mind that to give *real* support to the infantry the guns must be pushed forward, and that, therefore, as soon as the fire of the enemy's artillery has been subdued, be his position *never so good*, the commander of attacking artillery *must* push forward to a more advanced position, first, because the close presence of artillery gives infantry great confidence, and secondly, because if he does *not*, his fire will be sure to be masked by the advance of infantry earlier than it would otherwise be. Further, it is most important that the guns should be sufficiently advanced to take a part in the further developments of the engagement, to push forward if the attack be successful, to serve as a rallying point for the infantry in case of a counter attack, or to cover their retirement in case of repulse.

To be able thus to push on without delay, the commander should remember in taking up a position, to *look well to his probable line of advance*. Nothing can be more unfortunate than for artillery, when required to advance, to have to make a long detour. But one has often seen this the case!

It is always well, therefore, to have the ground in advance of the position as soon as possible reconnoitred by a scout, in view of a possible forward movement.

Some officers of other arms regard the forward movement of guns in support of infantry as impracticable. So it would be, if the enemy's artillery were in position and unshaken. But we must remember (*a*) no infantry attack can take place unless the artillery duel has been decided in our favour; (*b*) with the artillery shattered and our infantry at their throats, the enemy's infantry would not have much time to give to our advancing guns.

Their cavalry, however, might try and take the guns in flank during their advance, and the Artillery Commander must be on the look-out for this.

(*b*) *Pursuing a retreating enemy.*—Here the great object is to keep him *going* to prevent him from taking up good positions for defence. Much must, of course, depend on whether the retreat is orderly or a rout. In either case a bold game is the best, and risks may be run, which, otherwise would not be justifiable.

(*c*) *Resisting an attack.*—In this case everything should be done to strengthen the position, if time would allow, as it probably would. All ranges should be at once taken and written down—the line of retreat well reconnoitred. A deadly source of danger to a position of this is a nullah or covered way leading up to, or near to, the position by which troops would be pressed forward without coming under fire of the battery.

I have in my mind's eye just such a case, and I was directed to take up such a position during some manœuvres; a broad road led through the middle of the position; it was absolutely hidden from sight until it came over the crest of a low rising ground some 300 yards from the guns. Half a dozen regiments might have come up unseen and rushed the batteries. I did *not* occupy the position, but I must admit that the umpires held that I was wrong in objecting to it for the unanswerable reason that other Brigade Division Commanders had taken up the position without protest! Possibly the experiences of Maiwand will say better than half a dozen umpires whether I was right or wrong.

(*d*) *Covering our own retreat.*—Of these positions it is most difficult to speak; the idea being to *delay* the pursuit and to allow others to draw off. They must depend enormously on the movements of those who are retiring as well as of those who are pursuing.

In a rear guard action guns must be careful not to allow themselves to stay too long on a position, otherwise they may have to be extricated by the very infantry whose retirement they are endeavouring to cover.

The great object is to make the enemy leave the roads and deploy—retard him in fact—and then retire to a further position and repeat the operation.

In speaking of positions for larger bodies of Artillery, Brigade

Divisions and so on, the rules that guide are the same as for batteries, only that the difficulties are largely increased. A single Battery lies, or should lie, in "the palm of the Major's hand," but it will take a very large fist to include three batteries. Further, for one opportunity of drilling the Brigade Division that falls to the lot of the Lieut.-Colonel, the Major gets quite half-a-dozen of drilling his battery; and also for one position that suits a Brigade Division, there are many that will comfortably hold a battery, and with larger bodies still it becomes more a scheme of positions than a position, as it is rarely indeed that the conformation of the ground will allow of a large number of batteries being brought into action in anything like a continuous line.

And how is the art of taking up all these varied positions to be practised? I mean beyond the practice given on parades, field days, and manœuvres. Well, I think that we who are constantly riding about the country to exercise ourselves or our horses, can do a great deal by thinking out positions as we go along. Let us view the country over which we are riding as if it were one over which we were conducting either an attack or retreat, and let us ever be looking out for suitable positions for our guns. I know many officers who do this habitually—I do myself—and recommend it to the attention of those who up to this time have not done so.

Cross country riding is an excellent way to train our non-commissioned officers, and on odd days when the guns are not out, instead of keeping to the roads, Commanding Officers can give much instruction by working with their mounted men—by forming skeleton detachments, sending forward ground scouts, and indeed working as if the guns were present.

But in whatever light you view these methods—and I know there are lots of opinions on these subjects—do it somehow—remember that practice is better than precept, that the habit of looking at a country from a military point of view, and the habit of taking up Artillery positions, cannot be learned entirely from books, and though to a certain extent it comes as a natural gift to some, yet it can always be improved by the *best*, and cultivated more or less by those even who are *most deficient* in this particular. We know that every man is not a born rider, but there are very few recruits who have to be returned from the riding school as "unable to learn." Read up all that is said in the text books by all means, that of course you must do. But some way or another you must practise, and practise habitually working in the open, if you are to avoid failure in the hour of trial.

The massing of Guns for action is a necessity now universally admitted, that is to say, it is a necessity in war time. But how seldom have we the opportunity of practising in peace time the massing of guns even in Brigade Divisions. At only one camp did we get over two batteries together this year.

With regard to the movements and massing of larger bodies of Artillery very few of us have any practical experience, but should a war of any size break out there is no doubt that we should be called upon at a short notice to operate with a considerable force of Artillery.

At a station such as this (Kirkee), where there is the complete staff of a Brigade Division, and a concentration of four batteries, all officers, the seniors especially, have very great advantages such as cannot possibly be found at outstations.

With a view, therefore, of profiting by this fortunate circumstance and of illustrating the manner in which larger bodies of Artillery would be handled in the field, and also of practising on a larger scale than we have generally been able to do such matters as—

The transmission of orders in the field.

The chain of command.

The occupation of extensive positions, and

The massing of guns.

It is proposed during the present season, when in consequence of the rains the drill grounds are closed and it is not possible to manœuvre guns over the country, to form skeleton Batteries, Brigade Divisions, Ammunition Columns, &c., and by this means to learn, to a certain extent, our difficulties and the means of overcoming them.

We shall, of course, be short of Officers, but I am not sure that that is wholly a disvantage; it is eminently a 'service condition,' and will give us the opportunity of working the Sergeants as Sectional Commanders,—a duty which they would often have to take up on service, and in which they have under ordinary circumstances hardly sufficient practice to enable them to do justice to themselves when suddenly called upou to act in that capacity,

At Kirkee—

We have—one Battery of Horse Artillery and three Batteries of Field Artillery.

Each of these would be able to form either 2 or 3 skeleton Batteries, and several schemes offer themselves:

Such as the formation of—

(A)

Three Brigade Divisions and three Ammunition Columns, to be concentrated for combined action.

(B)

Two Brigade Divisions (Divisional Artillery).

One Brigade Division, Royal Horse Artillery and one field Artillery (Corps Artillery).

(C)

One Brigade Division, Royal Horse Artillery.

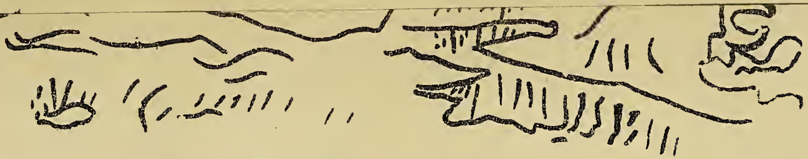
Two Brigade Divisions, Field Artillery.

One Ammunition Column (representing Corps Artillery only).

And so on. Of these 'B' seems most suitable.

The skeleton Batteries can consist of 4 or 6 guns, according as we have Officers and Non-Commissioned Officers available.

ion B.



1

DIAGRAM No. 1.

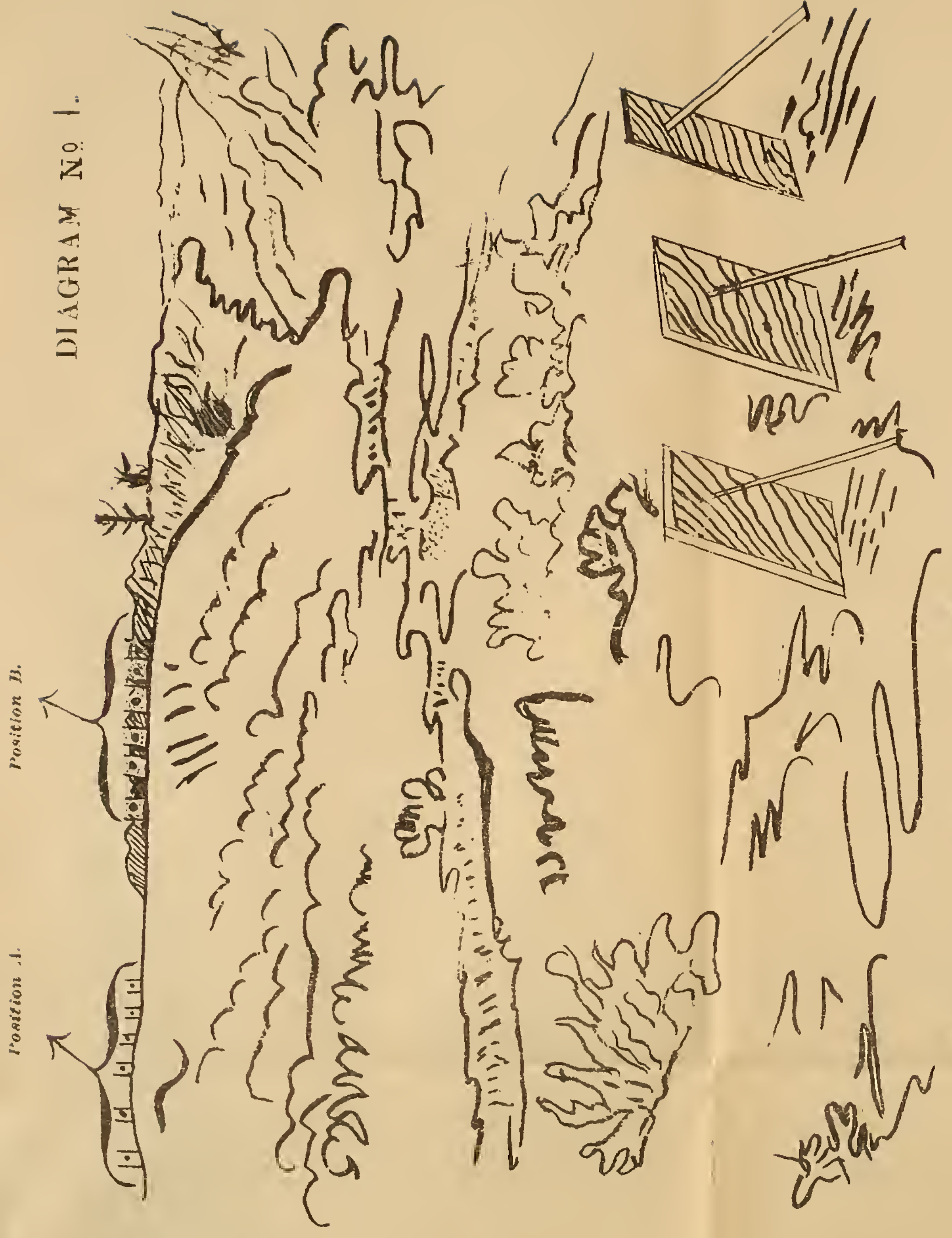
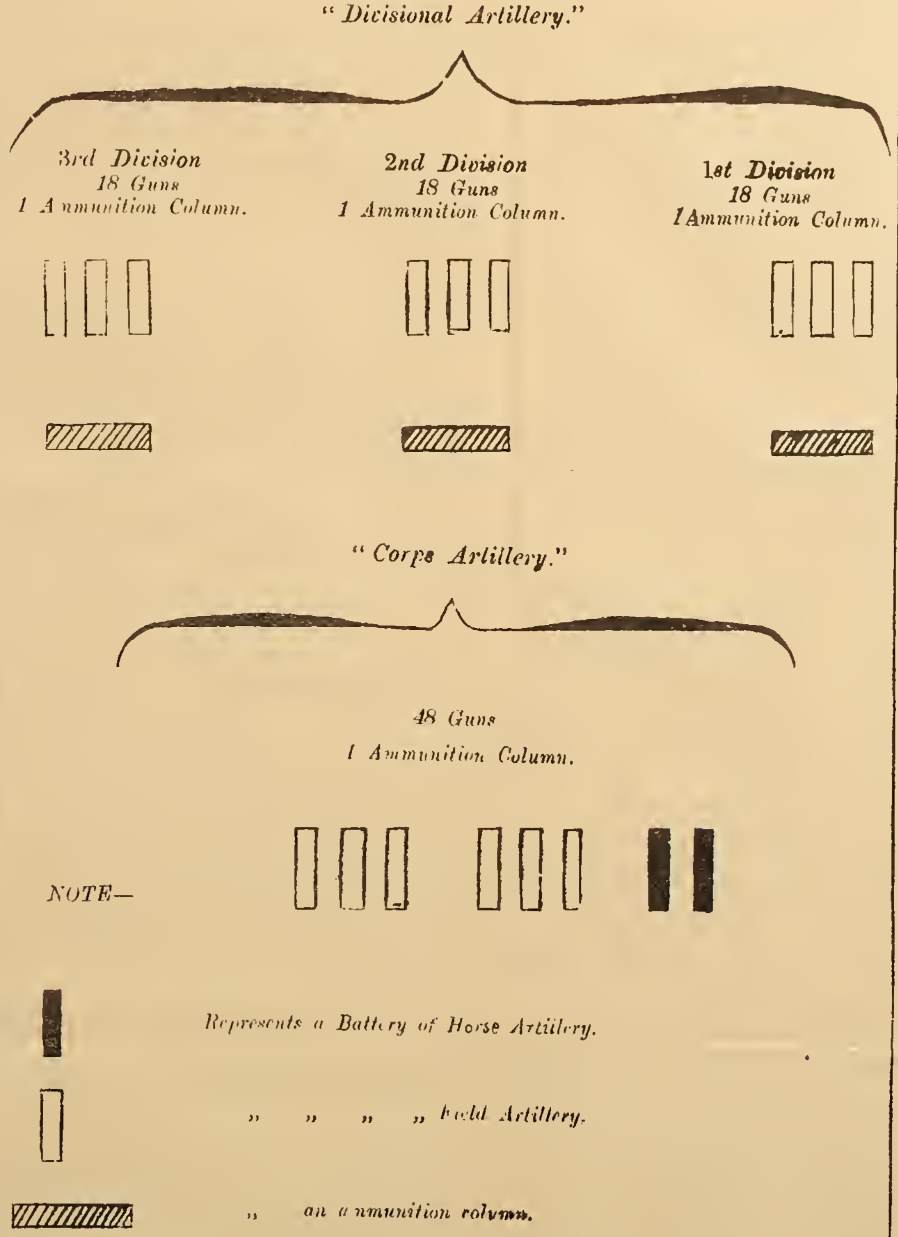


DIAGRAM No. 2

DIAGRAM No. 3.

DISTRIBUTION OF ARTILLERY WITH
AN ARMY CORPS OF 3 DIVISIONS IN THE FIELD.



WOOLWICH: LITHOGRAPHED AT THE ROYAL ARTILLERY INSTITUTION.

Guns to be represented by a mounted Non-Commissioned Officer and horseholder.

A waggon by a driver and a pair of horses, and so on.

Battery-Sergeant-Majors to act as Adjutants; Quarter-Master-Sergeants as Captains, and keep an eye on the ammunition column.

This is, of course, only a bare outline, and further instructions will be issued.

The whole business that we have to face in the field is at once simple and yet most complex. Simple if looked at quietly by oneself with lots of time to do it in, but most difficult and most complex when called upon to do it rapidly over new and unknown ground amidst the rush and rattle of the field. How hard to avoid and yet how deadly under these circumstances is flurry?

The only possible remedy lies in accustoming Batteries to drill under service conditions, methodically that is, with constant casualties and ever-changing country with new and unrehearsed schemes, so that the excitement caused by a sudden attack, or unexpected circumstance, is only a matter of every-day drill and does not degenerate into flurry. But to be able to do this the machine must work regularly; must have every part in working order. Every man must know what he has to do under all sorts of possible conditions and why; and though I think that in most Batteries the men know their *drill* right well, yet I do not think that when it comes to matters outside the ordinary parade work (manœuvres that is, or whatever we like to call it) they are carried out as intelligently as they might be, and the reason, or, at any rate, one of the reasons of this, lies I believe, in the fact that many Officers do not take their command sufficiently into their confidence, do not go beyond the Drill Book—in fact, do not explain to those who are working with them the *why* and the *wherefore* of the different phases of the engagements that occur in the various field-days in which they take part.

Take, then, two instances, and here I must tell you that I have purposely taken throughout my lecture examples that have occurred in this command during the past drill season.

On one occasion the division I was inspecting was fighting a retiring action. Just as they had limbered up on one position with a view to retiring to another, and before they had moved off, the guns were charged by a party of the enemy's Cavalry, who had worked round somewhat to a flank and came out from cover some three hundred yards distant. Well! the gunners on the axle-tree seats saw them, and sat complacently watching them till the enemy charged home. The Sectional Commander saw them, but it never seemed to dawn on him to take any action; as far as I remember, he did not even pass the news to the Battery Commander!

In the second instance (which I did not see, but read in an account of recent manœuvres), a Battery in retirement got utterly pounded through not having the road of retreat properly reconnoitred, guns lost "gratuitously," the chief Umpire said.

Now in each of these cases, an '*intelligent understanding,*' on the part of the Sectional Commander and the Gunners on the axle-tree seats in the first instance, and on the part of the scouts in the second, would have averted reproach on a field-day, disaster in actual warfare.

It is a lesson I think we should all of us do well to lay to heart, if we are to make the working of Artillery in the field thoroughly *sensible* and up to date; two qualities absolutely indispensable to our usefulness; indeed, I may say to our very existence.

MILITIA FIELD ARTILLERY.

BY

CAPTAIN J. C. WRAY, R.A.,
Adjutant of the Honourable Artillery Company.

General considerations

THE country is in want of more Field Artillery (at a low price). I propose to show in this paper in what manner, I believe, this want can be supplied. Three years ago I should have scoffed at the idea of the supply of field guns by the auxiliary forces, and it is only since my service with the Honourable Artillery Company that the certainty of success has come home to me.

Being at present adjutant of the Honourable Artillery Company, I feel a good deal of diffidence in dragging them into this matter, as however they are the cause of my change of opinion, it is impossible for me to avoid it.

Those officers of the Royal Artillery who have seen these batteries at Aldershot during the last two years, will, I think, agree that they are really mobile Field Artillery, that is that they are capable of travelling fast over rough ground, of forming line correctly and quickly, followed, when necessary, by a final advance into position at the gallop without loss of time in coming into 'action.'

The Government at present grant a sum of £100 a year, per 4-gun position battery, for the expense of providing horses, and the regulations lay down that the battery is to go out mounted four times a year. This is, therefore, an allowance of £25 per mounted drill, which is sufficient for the purpose, but it is obvious that with this amount of mounted work (four drills) only very moderate proficiency in field movements can be attained. To turn the position batteries of Volunteer Artillery into a really mobile force, would, I consider, cost at the very least another £800 a year per battery, and would even then only succeed where the local circumstances in the way of drill-ground are favourable. Except for preliminary drill a large grass field is quite useless for the purpose. Rough and extensive ground is required over which long and rapid advances can be practised. With drill in a field they will reach a certain standard of very moderate efficiency, and in spite of every effort there will be no further improvement.

Let me at once say that I am aware that there are a few of the present position batteries which can be classed as Field Artillery, but they each owe this to some great initial advantage, such, for instance, as that of the 3rd Kent A.V., whose men are recruited from the Royal

Arsenal at Woolwich, and are mostly old gunners and drivers of the Royal Artillery.

With regard to gun-drill, there are fewer difficulties in the way of volunteers. Most corps have good drill sheds, where gun-drill can be thoroughly taught during the winter evenings; frequent drills are possible and cost nothing. The report on the work of the National Artillery Association at Shoeburyness shows that a high standard is attained in this respect.

Training of artillery branch of H.A.C.

I now propose to show briefly what training the batteries of the Honourable Artillery Company get, and then to compare that which the militia would carry out. The artillery division Honourable Artillery Company consists of one Horse and one Field battery each of four guns. During the six months, from October 1st to April 1st, there are two evenings a week for riding-drill, and another two for gun-drill for each battery (they do not at this season drill together).

With the beginning of March we start driving-drill on Saturday afternoons, there is also driving-drill on other evenings for recruit drivers as soon as it is fairly light after 6 p.m. (say the end of the second week in April). The driving-drills gradually merge into battery drills, followed by one or two brigade division drills, before going to Aldershot for a week at Whitsuntide. The batteries usually march to camp and return by rail so that experience is gained in billets, in entraining, and detraining. Whilst at camp they are out mounted six hours a day, the inspection taking place during the last day's work (the G.O.C. R.A. at Aldershot has for the last two years been the inspecting officer).

The guns (and detachments of Horse Artillery) are now all horsed by the same firm, with whom there is of course a contract including the ordinary work and mobilisation. In the course of each year we generally get the same horses, and in the following year there is a good percentage of trained horses again.

As soon as Whitsuntide is over, the work is almost entirely fire discipline followed by gun practice in the middle of July; the men going down to Shoeburyness on a Thursday, returning the following Monday.

Finance H.A.C.

Every penny received from Government, *i.e.*, the Capitation Grant, travelling expenses, allowances for camps, etc., goes toward paying for the gun teams; the mounted men of the Field battery and the gunners of Horse Artillery pay for or find their own horse. The men also pay for their uniform, their expenses in camps, all riding lessons, and they in addition pay a yearly subscription to the corps.

The Government, therefore, certainly gets its moneysworth.

I need hardly say that the number of men prepared to bear this expense and the very hard work in camp is limited, and therefore, the country cannot hope to increase the number of batteries doing so much mounted work for so little money, especially in these days when bicycling, golf, football, cricket and rowing are very much on the increase.

The Honourable Artillery Company are also very fortunate in having a drill-ground at head-quarters, so that there is no waste of time when parading for driving-drill in going to and fro from barracks.

Circumstances in favour of efficiency

I think it will be conceded that this combination of money with a drill-ground at head-quarters and fair proximity to Aldershot, gives the Honourable Artillery Company great initial advantage over other regiments, and this, added to the *esprit de corps* and rivalry between the two batteries, has, in a large measure, enabled them to attain their present standard of mobility. The training received by a recruit (a mounted man) of the artillery division Honourable Artillery Company on an average consists as follows in each of his two first years : 2 rides of 1½ hours each for ten weeks, equal to 30 hours ; 30 drills at head-quarters, equalling about 45 hours ; 6 days at Aldershot at six hours a day (this does not include stable duties, etc.) 36 hours ; total 111 hours or in two years 222 hours.

Comparison of training ; H.A.C. and Militia

I will now consider the training that the Militia Field gunner would receive. During the two months preliminary training, recruits, both gunners and drivers, should respectively get through gun-drill and riding school, and the latter should also begin driving during this time. These two months would be followed by the ordinary training, which should never be less than five weeks, four weeks field movements and the fifth week at gun practice.

Without reckoning stable duties, the recruit would do at the very least 4 hours a day or 24 hours a week for the three months, or 288 hours in his first year ; in his second year he would do 24 hours a week for one month, or 96 hours, a total of 384 hours in the two years. Compared with the Honourable Artillery Company, this gives a large excess which would compensate for the inferior intelligence of the militia recruit, and for perhaps, rather less of the red hot zeal that purely voluntary service inspires.

Militia get through a considerable amount of drill during their ordinary training, and I am convinced that by keeping hard at it they would, with the first year's training of three consecutive months, followed by an annual training of 35 days, reach a very high standard indeed.

General scheme—horses

As regards horses, it would of course be impossible to hire these, the expense would be too great, they would have to be bought, the system being pretty much as follows :—Taking the brigade division of three batteries as the unit, sufficient horses would have to be bought for three complete batteries with six guns and six wagons (six horses in the latter) for each battery.

Barracks

A school would have to be formed for Militia Artillery either at Aldershot or on the new ground on Salisbury Plain, barracks and stables being built to accommodate the brigade division.

Training

The first brigade division, to arrive in April, would train for four weeks and then go away for practice, leaving its barracks, horses and guns to be taken over by the second brigade division, who would train during May, the third brigade division in June and so on, the 6th finishing at the end of September. If room could be found at Okehampton or elsewhere they might go mounted to practice every third year; this would bring the end of the training of the sixth unit to about October 7th.

Result

With the barracks, equipment and horses, therefore, of one brigade division, six brigade divisions, or 108 guns, would be trained.

Reasons for the number of horses

It will be noticed that the batteries have more wagons than is usual and a full complement of horses. The batteries would not, as a rule, use more than four horses per wagon on the days when the wagons were taken to drill; the remaining horses would be kept for the recruit drivers of those brigade divisions whose training overlap.

Employment for horses during non-training period

It will be objected that as the recruits of the first unit do not come up till February, the horses will have nothing to do for four months, most of them in fact for six months. I would, however, reply that from November till April these horses might, with great advantage, be distributed to various military centres and used for giving the ammunition columns an airing (which they do not often get at present) and also to enable batteries of R.H.A. and R.A. to turn out in war strength without taking the horses away from every other battery in the station.

Staff

With regard to *personnel*, a colonel and adjutant from the R.A. to superintend the whole training; a riding-master and quarter-master-sergeant to keep an eye on the equipment and barracks; a sergeant-farrier, collar-maker and wheeler, these artificers to superintend the work of the militia artificers—the above, together with an office clerk, might form the staff.

Personnel

I believe that there are many retired artillery officers of all ages who would be delighted to set the ball rolling, and, I believe, that service in Field Artillery would appeal to a new class of militia recruit, but if any of the present militia brigades can be spared from coast defence, they might be converted, the officers to start with being attached for at least six months to a regular battery. The permanent staff should also, at first, be a large one, all No. 1's being drawn from the Royal Artillery, as well as a certain number of drivers, the latter being men who have finished their time in the Army Reserve.

Size of each unit

The unit has been taken as the brigade division, but the scheme would adapt itself to a unit of two batteries (or one to start with), and could be gradually expanded. Even the latter would give us an increase of 36 field-guns.

There are many small points to be considered which I will not enter into, such for instance, the horses which would have to be in their prime and have liberal feeds if they are to get through the very long hours they would be expected to work. We give the Honourable Artillery Company's horses from 14 to 16 lbs. of oats a day when they are at Aldershot, and I fancy we should soon lose our contractor if we did not.

Equipment

The equipment for one unit would be kept at the school, that for the others would be kept in store at such places as should be selected, the harness, etc., in use to be replaced from these stores, which would in turn make up their equipment from Woolwich. The present reserve of horses would have to be augmented so as to provide for the other five units.

If these batteries could be armed with the same gun as the R.A., the position batteries of the volunteers might be armed with a really powerful position gun, say a 25-pr., or else with a field howitzer. Their present mobility is sufficient for this work, and the fact of having a really heavy gun would prevent many corps from attempting the impossible.

Whether a scheme can be successfully applied or not depends on its cost, which I will here sum up. Compared with a brigade division of R.A., the cost of each brigade division of Militia Field Artillery would approximately be:—

For wear and tear of equipment, 1 month's field training or $\frac{1}{12}$ of R.A.
Pay, rations and clothing rather more than above, as a certain number of recruits are up an extra 2 months; say, therefore, $\frac{1}{10}$ of R.A.
Horses, each battery would use its horses a little over a month, say $\frac{1}{10}$ of R.A.
(It will be remembered that for 6 months it was proposed to find work for these horses elsewhere).
Barracks, 6 units would use the same, which equals $\frac{1}{6}$ of R.A.

The only item over which there could be no saving would be the cost of gun practice.

Why have militia and not Volunteer Field Artillery

In conclusion, I would urge that the last thing I wish to do is to run down the capabilities of the Volunteer Artillery. They can perform efficient service as *position* artillery, but they cannot make bricks without straw, and turn themselves into *Field* Artillery without a very large increase to the present grant, and I very much doubt whether the Government would give them this unless they could get the volunteers to give conditions of service somewhat similar to the militia, and to do this is out of the power of most of them.

METHODS OF BRINGING GUNS INTO ACTION.

BY

MAJOR-GENERAL T. B. TYLER.

INSPECTOR-GENERAL ROYAL ARTILLERY IN INDIA.

THE Horse and Field Artillery seem to revel in controversy. When the deliberate method of coming into action was first practised, there might be witnessed in the Long Valley, on Woolwich Common, and elsewhere, the strange spectacle of officers and gun-layers hurrying towards an imaginary ridge—their brows bent with the frown of resolution, and their attitudes suggesting secrecy and stealth—waved on by Majors, whose high characters and undoubted abilities were a guarantee of their earnestness and their belief in the gravity of the situation. But soon a change came over the spirits of men; a cry arose that such proceedings savoured of cowardice and timidity, and would demoralize the nation. Let the thoughts of cover be flung aside, the direct method only is worthy of Britons! and the deliberate method was laughed to scorn. Happily, after much talking and writing, wiser counsels prevailed, and it was recognized that both methods are useful in their places.

Shortly afterwards the case of "Concentration v. Distribution" attracted attention; the discussion was continued for a time with considerable fervour, and culminated in a duel between the champions of the rival systems, which took place at the Royal Artillery Institution. Fortunately it was discovered that both were right, and in time the storm passed away.

At the present time a battle is being fought with great spirit and controversial skill, round the question as to whether guns shall, under any circumstances, be run into the firing position by hand. To creep, or not to creep, that is the question.

Colonel Turner and Captain Pilcher have ranged themselves on one side, Captain Headlam on the other; Major Keir has also joined the fray, but I confess I rather agree with Captain Headlam that he has mixed up the questions of indirect fire, and fire from behind cover—two very different matters. And I cannot quite make out into which scale Major May throws the great weight of his opinion; on page 378 of his paper in the July *Proceedings*, he seems to advocate "creeping," while on pages 379 and 380, he appears to deprecate it.

Major May and Captain Headlam lay great stress on an experiment in running up guns by hand at Okehampton, on which the Commandant reported that "the fatigue entailed was very marked, most of the detachments were quite unfit for their duties for some minutes; anything like accuracy of laying would have been out of the question for some time." I have carried out similar experiments in India, and have not observed such signs of excessive fatigue after the operation. But I know the ground at Okehampton pretty well, and I cannot remember any part of it where guns can be run up to a crest without hard work on the part of the gunners. The experiment therefore seems to prove nothing, for no sensible officer would run his guns up by hand on ground which would exhaust his gunners to such an extent as to incapacitate them for a time from serving the guns.

A good deal is made of the difference between exposing men to view for 1′ 14″, and men and horses for 1′ 20″. These calculations hardly seem to me to touch the real argument, which is: how can guns be best brought into action so as to attract the least notice, and incur the least danger? It is not likely that in either period much real damage would be done by hostile fire, but in one case the position *might not* be disclosed, in the other it certainly *would be*. I have more than once found the position of a battery in action, by catching the glitter of the metal of the harness on the horses of the limbers *in rear*, when I could not at first make out the guns. Captain Headlam asks:—"how was it possible to bring the guns into action, without any sign of a man until fire was opened?" Well, in my opinion, it is quite possible, and I will give an instance. At Muridki, one of the Punjaub practice camps, the batteries advanced to the range through a belt of scattered timber situated about a mile distant from the ordinary *rendezvous*, and on the several occasions when I have watched for their arrival the first thing which caught my eye through the trees was the glitter of the metal-work of the harness and accoutrements. Now if a battery had unlimbered beyond the trees, and the guns had been man-handled to the edge of the belt, (the ground is perfectly level) I should have known nothing of their approach till fire opened.[1]

I will give another instance which, though it is not direct proof, has a bearing on the question. I was watching the practice of a Mountain Battery near Quetta; the range party consisting of two or three men clothed in *khaki* were on the spur of an opposite hill, two or three hundred feet below the firing position and about 3,000 yards distant from it. Though I knew the men were there, and could see them with a telescope, I could not make them out even with good glasses. Now suppose a battery had been in action on that spur, firing cordite, would it not have been equally hard to discover? for in India not only the carriages, but the guns themselves, are painted *khaki* colour.

An invisible battery served by invisible gunners would introduce a novel and disturbing factor into the calculations of the opposing force; and I commend the subject as a study to Major May and the writers on the tactics of the future.

---

[1] There is an idea that Northern India is generally a treeless waste; this is not so. For many miles round Lahore and Muridki there are tracts of scattered timber, usually in the form of belts, and sometimes two miles long; at Chillianwalla, the Sikh army was drawn up behind ground thickly covered with trees and scrub which greatly impeded our troops; and at Meanee, a large portion of the Belooch Army had taken up a position behind a wood of considerable extent.

I have maintained for several years that sanction should be given to the principle of running guns up by hand when the procedure seems advisable. No one would want to do it always, or even often, as the advocates of the "German Method" seem to believe would be the case, but why forbid artillery from taking all advantages possible of every position in which it may be placed? It may be said that the principle is not forbidden, and in explicit terms it is not, but in the drill books for all arms of 1896, (except the F.A.D. book) and of previous years, there are introductory memoranda from the Commander-in-Chief (or written in his name) to the effect that:—"the following edition of the ————Drill is to be strictly adhered to." Why there is no such introduction to the F.A.D. Book I do not know, but it cannot be doubted that it is governed by the same order. Therefore in my belief, a system which is not recognized in a drill book, is forbidden. When I was at Shoeburyness last October, I wrote a note of my opinion on the subject, to the Commandant of the School of Gunnery; it was that a clause somewhat to the following effect should be inserted in the drill book:—"Circumstances may arise which render it advisable to unlimber short of the selected fire position, and run the guns up by hand."

The officers who have taken part in the discussion have, I believe without exception, assumed that the run up must always take place on an ascending slope, but I would point out that it may be necessary to come into action and fire downwards from a table-land, or from ground which is to all intents and purposes a table-land. And in this country, and I doubt not elsewhere, fire may be opened from a jungle of scattered scrub, or timber, or from high grass or crops, amongst which the guns and detachments are almost indistinguishable, while a mounted man would be readily seen. Strict adherence to the drill book would no doubt in such cases be dispensed with, but the rules in drill books are intended as a guide under all circumstances, and they should be sufficiently wide to include all ordinary conditions.

A SHORT SUMMARY OF THE COVER QUESTION.

I.C.

BY

MAJOR J. L. KEIR, R.H.A.

TO arrive at a satisfactory decision with regard to a practical subject, by means of mere argument, is not possible and I do not therefore consider that any useful end would be gained were I, even if permitted, to fill the "Proceedings" with what threatens to assume the form of a personal controversy. My object in writing my original article, was to draw forth from the other officers of my regiment, who might be interested in the questions of cover and indirect fire, an expression of their views on these subjects; and in this I am inclined to think I have been partially successful. I had, however, no wish to injure the feelings of anyone, or to question the soundness of our drill-book. At a lecture given by Captain Pilcher, Captain Headlam, in his reply, advanced certain reasons, moral and technical, why he considered indirect fire should not be employed. As I had not before seen these drawbacks to its use placed in so clear and concise a form, in dealing with the disadvantages of indirect fire, I endeavoured to point out what I considered, and still consider, some of the weaker points, taking them in Captain Headlam's order and verbatim. In reply to these comments, he has, in the July number, made some more or less severe criticisms, my rejoinders to which I forward, although for the reasons above stated, I do not feel I have any right to ask for their publication.

The question of the importance of cover for Field Artillery in the present day, appears to have produced two distinct divisions.

In the first, which we will call its opponents, some, remembering the glorious traditions of the past, and the gallant deeds performed by gunners without its aid, almost shudder at the very word. Others, more or less trained in what we may call the Asiatic school of tactics (many of whose records show great services rendered to the State and much war experience) are also averse to its encouragement. While there also exists a third section, who, acknowledging its importance when opposed to a perfectly trained European artillery, regard its study of no importance in our army, for the reason that "we are never likely to fight again on the continent of Europe."

The second division, representing its supporters, consists of a number of officers who endeavour to keep themselves up to date with regard to service matters, by the study of the latest continental literature, and visits to foreign manœuvres and modern battle-fields. These hold it as their opinion that the high training of the *personnel* and the improvement in artillery *matériel,* render the study of ground and the skilful handling of artillery at long ranges, subjects of greater importance, than in the days, when the extreme range of guns was limited to a few hundred yards, time shrapnel was undeveloped and smokeless powder unheard of; and therefore concur in the continental opinion that cover has now become an important consideration for artillery officers.

As neither side can claim practical experience, the verdict of time can alone decide who is right. There is, however, this to be said. That the tactics so clearly laid down in our drill-book for Horse and Field Artillery are only applicable to contests between European armies, and cannot be said to apply to savage or semi-savage warfare. To enter upon a European campaign with almost a contempt for the practical study of the latest continental methods of warfare, would savour of that narrow-minded self-satisfaction, which is generally regarded as an effectual bar to real progress.

The following are my replies to Captain Headlam's principal comments.

All references are to Vol. XXIV., No. 7., July 1897, "Proceedings" R.A.I.

Page 390, line 11.

"And yet anyone reading Major Keir's paper would think that "'indirect fire' and 'fire from behind cover' were synonymous "terms."

"I am sorry if I have not made myself clear on this point, but 'fire "from behind cover' implies the use of 'indirect fire.'"

Page 390, line 37 to line 12, page 391.

"*I.—It is very rare to find ground where you can carry on the practice with more than a single battery.*

"No doubt positions can be found easily enough when firing blank, "but when the question of the shell clearing the crest of the cover has "to be taken into account difficulties crop up. That this point is not "attended to when firing blank is proved by the frequency with which "batteries do take up such positions at Okehampton, and are only "stopped from firing into the covering ground in front by the Comman-"dant interfering. At manœuvres such positions would often be much "admired.

"More than this, every gunner will admit that to get any effect from "our fire the battery commander must be able both to observe his fire "and to command his battery. The ground must, therefore, afford a "position for him close to his battery from which he can see the target.

"This is frequently a difficulty with a single battery. What are you "going to do in the case of the centre battery of a brigade division?

"Unless you mount the battery commander on an observatory, I can-"not see how he is to observe his fire without being shot, or at any "rate considerably disturbed, by the flank batteries. I notice that no "one has yet advocated the adoption of the portable observatories "which have been experimented with on the Continent. Like many "other excellent things, I am afraid they would be killed by ridicule in "this country."

1.—The fact that batteries make such mistakes as those instanced, shows inexperience in taking up positions under cover. These would not occur were the occupation of concealed positions made a subject of more importance.

2.—With smokeless powder there is no reason why the C.O. should not observe standing on a wagon or limber in rear of his guns.

Page 391, line 40. "Major Keir commences by saying (1) 'that "concentration of fire will be practically impossible in future even when "firing direct.'"

I am unable to find this statement. That it will be more difficult than formerly I certainly said and still think.

(2.) "'That changes of target are only a practice camp condition.'"

Frequent changes of target such as our batteries are put through at practice camps can hardly be expected in war, before any appreciable effect had been produced upon the objective.

Rapid changes of target are of great importance and I can find nothing I have written to contradict this opinion.

(3.) "And that on the battle-field 'where your action is to a great extent dependent on the adversary,' difficulties of changing target will be much less felt."

What I did say is "this (viz., objection 2, *i.e.*, that you cannot change your target without making elaborate arrangements) is no doubt a serious disadvantage on the practice ground where changes of target are of necessity frequent and no enemy has to be considered. But on the battle-field where your action is to a great extent dependent upon the adversary with whom you are engaged, it (*i.e.*, objection 2) would, even if the case, be much less felt." Meaning, of course, that on the battle-field changes of target would be much less frequent than on the practice ground on account of the difficulty of breaking off an engagement with the enemy.

Criticism is fair, but misrepresentation is not fair. I do not think for a moment that Captain Headlam has wilfully misrepresented me, but I cannot refrain from referring him to his remarks on page 395 with regard to the anonymous German officer.

"The criticism of the anonymous German officer cannot be seriously answered, because it is evident that he either did not take the trouble to read my remarks before criticising them, or that he read them in a very bad translation."

Page 392. With regard to the remarks about my proposed method of firing from behind cover, I can only reply that questions of this sort can only be decided by impartial practical trials, not by mere writing.

I next come to the criticisms on my remarks about the service moving targets. "Major Keir assumes that the only pace for cavalry on the battle-field is the gallop."

Yes. When charging batteries.

Referring briefly to the remainder of the criticisms, I will say once for all. My remarks on this subject apply to our *regulation* method of dealing with moving targets. That a cavalry charge, or an infantry attack, is at all adequately represented by a few barrels drawn by wires towards a battery, or a number of trucks moving along a line of rails, which terminate behind a butt, the range of which is well known to those who have been to Okehampton year after year, I do not admit.

And my opinion remains, that beyond a useful exercise at practice camps in training gunners to work quickly, our moving targets are of little real value as a representation of actual attacks by cavalry and infantry. The interval that must elapse when passing from battery fire to that nature used with separate ranging and shrapnel sections, and the lengthy words of command that must travel from one end of a battery to the other at a time when quickness is supposed to be of vital importance, all tend to stamp it as a range makeshift for training gunners.

Captain Headlam is inclined to be severe on the subject of my remarks about the "level plain." But may I enquire where the experiment to which he refers on page 392, line 38—

" 'One of the great points brought out by the trial of the regulation "method when tested against another proposed by various officers was "that 'its advantages are especially apparent when the advance of the "target is irregular:' " and which in his mind appears to have established once and for ever the superiority of the regulation method over all others, was carried out. If at Shoeburyness, for instance, we have a very fair approximation to the "level plain,"

Next come the criticisms with regard to moral effect.

Captain Headlam begins by repeating his actual words. "If you train Field Artillery to consider firing from behind cover as *practically the rule* you will destroy the whole spirit of the arm."

In this I quite agree with him, but why have *rules* at all in a matter of this sort; *directions* by all means. Rules afford cover for weaker natures to shelter themselves behind and only hamper stronger ones. While directions allow a freer scope for action, encourage initiative and foster self-reliance. Had the spirit been inculcated into our officers at the time I referred to, I am sure the "indirect method at 600 yards and a perpetual search for cover" would not have been the result. In doing what they did the officers supposed they were following the *rules* of the drill-book.

Finally, Captain Headlam says:—"I should like to ask Major Keir where he finds that there is any idea of arbitrarily deciding that direct fire and no other is to be used."

The idea sought for is derived from the following facts.

To employ indirect fire the use of the clinometer is a necessity. Not only is the clinometer in use in a large number of batteries unsatisfactory, but also, though prizes are given for good shooting, the greatest importance being attached to the results, in the competitions for which Scotts' sights, tangent sights, or clinometers may be used; the conditions are so framed as to practically preclude the use of the latter. Further, let any unprejudiced person read page 12 of our drill-book and compare the importance assigned to cover (and consequently to indirect fire) with that given to it in the present drill-books of European armies, and I think he will allow that the *idea* is not without some justification.

In conclusion, what I submitted for consideration was "the issue of clear and detailed instructions for a uniform method of the occupation of positions behind cover *so as to disclose the position of the guns as little as possible*," a question I went into in my former paper.

FEB 21 1898
U. S. PATENT OFFICE

THE SERVICES

OF

LIEUT.-COLONEL FRANCIS DOWNMAN, R.A.,

IN

FRANCE, NORTH AMERICA, AND THE WEST INDIES BETWEEN THE YEARS 1758 AND 1784.

EDITED BY

COLONEL F. A. WHINYATES, *late* R.H.A.

CHAPTER II.

Lieutenant Downman's occupation and amusements. A canoe voyage. The peace of 1763. Return home. Voyage to America. A violent storm. Letters on the outbreak of the American War of Independence.

In the beginning of July, 1761, I was ordered by Governor Melville round to Fort George, with directions to transport an 18-pr. to Marigot in Capes Terre, where Lieutenant Campbell of the Engineers had erected a small battery. This piece of service took me up some time, as a catamaran had to be made on which the gun was to be carried. This machine, if well made, is of great use, for it will bear a vast weight, and will go into very shoal water, which is very necessary for the convenience of landing anything, particularly cannon. It is made of large and small timbers, which are lashed together with ropes, leaving vacant places for fixing empty casks, any number that you please, according to the size of the catamaran or the weight that you want to carry. A catamaran made in an oblong form long enough to contain 20 hogsheads, five in each row, will, with great safety, transport four ton and a half weight; the bungs of the casks must be upwards so that you may pump them if it should be found necessary.

In the month of February, 1762, I was appointed to act as Barrack-Master of Fort Royal, but I did not enjoy the advantage of this place long, for another person, who had more interest with the Governor than myself, was put in my stead, and I received orders to repair to Grande Terre to take the command of the artillery in that island. I immediately set out by land for that place, passing over the Dos d'âne, through the Capes Terre, St. Marie's, Goyave, and then to Petit Bourg, my old quarters, from whence I took boat and crossed over to Fort Louis (now Fort George) on Grande Terre. This place I found very different from what it was at the time of the siege. Major Appleton, who commanded here, had taken great pains and trouble to have the wood cut down that was growing near the fort; and likewise to have the water conveyed away by ditches, which before used to lie in stagnant pools, and besides the pernicious effect of such water, it used to breed innumerable quantities of mosquitoes and sand flies, which are the only disagreeable things to be met with in this country.

Fort George is a very insignificant fortification, the walls being so weak that the firing of its own guns is sufficient to bring them down without the assistance of an enemy. However, there are very good quarters in it both for officers and men, but from being entirely shut out from the wind, the mosquitoes are intolerable. Just below the fort we have erected a barbette battery, mounting 12 or 15 cannon, but from the difficulty of getting stone it was not finished before giving up the island. Very good barracks for the officers were made here just under the fort, and a large house was built upon a hill near it, wherein the commanding officer lived. This place was very unhealthy at first, but through the improvements that were made, it became as good a situation as any in the island. This island labours under the irreparable disadvantage of want of good water; except rain water, there is none that can be drunk with any degree of pleasure, and the only place where this can be had is in a wood about a mile from the fort. The rain water that is procured in the fort is preserved in a tank or reservoir, which will contain a great deal, but you may imagine it cannot be very good, as it is under the buildings, and of course deprived of air which is the only thing that can keep it sweet. Every house in the fort has troughs under its eaves, which communicate with each other and convey the water to the tank.

This place agreed with me very well, and it is well adapted to any person who is fond of the diversion of either fishing or shooting. A number of little islands lie between the fort and Petit Bourg, which in the season abound with curlew and plover, and at other seasons you can always find something or other to give you entertainment. A great variety of fish are to be caught here, and very good, and there are a great many ways of taking them, either with the seine, cast net, harpoon or dart, with a rod, or with a hand line, and by a method which will at once supply 200 or 300 men, which is this. You observe when it is low water, and on the flats that lie just within the harbour, you make a fence, either with boards or as a hedge. If the latter, it must be very closely twisted together, and well driven down with stakes; it need not be above 3 feet high, but this depends upon the rising of the tide. Your enclosure is to be in a bight, so that by running a fence across it you entirely secure it, but some have been made in the middle of the flat. You make it round or square as you think best, observing to leave three or four openings. When you see the tide at its height you must go carefully into the water and fasten all your gates, or if you will, lay a net or two at them, by which means the greatest quantity of fish will be taken in them, otherwise they will be dispersed all about your enclosure, and take up more time in collecting. It is almost incredible the number of fish that may be taken by this means, and as we frequently had more than could be used in one day, the remainder were put into crawls which we had made for that purpose.

We likewise caught fish here with pots made of wicker, indeed this is the general method used by the French, for it needs little attention, no more than to visit them every morning. The fish pots are laid in deep water, being sunk with a stone and attached by a rope to a small buoy. The best fish at this place, I think, is the rock cod. Another agreeable amusement is the striking the craw fish, which grow to a vast size; I speak within bounds when I say I have seen them of 20 lbs. weight. Another method was to go in a boat or canoe, with a dart, among the coral rocks that surrounded every one of the little islands. The water is so excessively clear that you may discover anything at the depth of eight or nine fathoms, but the craw fish are generally found at four or five feet in the cavities of the rocks, and were very easily taken. They are of the nature of the lobster, but I think their meat more delicate. The oyster here is not to be found on the ground as they are in other countries. The only places I could find them in were up the lagoons, or in ponds, growing on the branches of the mangroves, or on any other timber that was near the water's edge. They adhere so strongly to the wood that you are obliged to use a hatchet to get them off. I have found them on stones and rocks likewise, but they are much smaller than those that come from the trees.

Besides these diversions, you may pass your time exceedingly agreeably in observing and collecting the other curious or extraordinary productions of the sea. Had I at this time been sensible of the attention that is paid to shells, I might at this place have made a most admirable assortment, for the shores of these little islands are covered with an innumerable quantity and a very great variety. Among these pleasant little isles and in the harbour of Fort George, I spent a good deal of my time. A small canoe I had served me for all these purposes and in this I have some times gone to Petit Bourg, though when the wind blows even a little there is a disagreeable channel or two to pass. The harbour of Fort George is the largest and most secure of any that I ever saw or heard of; it is entirely land locked, and no wind that blows can effect any ship that is in it. The entrance into it is very narrow, between some rocky islands and Hog island, directly opposite the fort. The depth of water is about 23 or 24 feet. About a mile and a half within the harbour is a little village, called by the French, Point à Petre, but it is now called Pitt Ville, and is much improved since the English have been here. A little further up the bay is another village called Abymes.

Amongst the many amusements which this island affords, that of goat hunting is one of the principal, both as to pleasure, (as difficulties in hunting are accounted a pleasure), and profit. A very little distance from the fort, towards Le Gosier, are very high rocks which overhang the water and are almost inaccessible to us, but these cunning and sure-footed creatures have taken up their quarters here, and very good ones they are, for nature, considering their inability to provide for themselves, has furnished them with large convenient caves which shelter them perfectly from wind and weather. I was one day out after these creatures, and luckily came in sight of them browsing upon the hill near the rocks. I daresay there were 30 young and old; immediately upon my firing, they scampered away to the rocks, and notwithstanding the clumsiness of their feet, they jumped from the point of one rock to the other without making the least slip; indeed if they had, they must have tumbled headlong into the sea.

I was determined to follow them if possible, and therefore went the same road I imagined they had taken, amongst monstrous broken rocks and roots of trees, but I was obliged to take the greatest care in my progress, for it was both difficult and dangerous. At length, after a good deal of fatigue, I discovered a little path made by the goats, leading under the precipice; this I kept, but with much hazard of my neck, till I came to the mouth of a little cave. I looked into it but could not see one goat, but going further, I perceived by the track that they had another way from these caves. I therefore thought it best to sit down and wait till towards evening when they would be coming to their lodgings. I had not waited long when I heard some of them bleat, and in a few minutes I saw three or four coming in by the way I had taken. I fired immediately and wounded one, but before I could get to it, it had by its struggling fallen a great way down the rock, and where it was impossible for me to go, and the night coming on, I was obliged to get out of this dangerous and romantic place as fast as I could. I was out another day with some officers when we had better success, for we found the goats feeding in a wood, and before they could make their escape, killed two. After this they became very shy, and took so much care and kept so good a look out that we could not get a shot at them again.

I must not omit to mention the land crab, which is, I think, of all creatures I know, the most ugly and forbidding; they are made like the sea crab, but grow to a great size, and all their legs and some parts of their body are covered with long black hair. These creatures inhabit the low marshy ground, and are mostly found among the mangroves, and numbers have taken up their abode in the burying ground. Notwithstanding their frightful appearance and their filthy abominable feeding, they are eaten with great *goût* by the inhabitants and by our soldiers; for my own part I never could be brought to taste them.

There is another crab which at a particular season frequents the savannahs or meadows; these are very small and of a reddish colour, and are held in much estimation by the French. I have often dined at their houses, when a most excellent soup has been served up, made entirely of these crabs.

The large land crabs are very difficult to be caught except at night, at any other time they are scarcely seen, and when they are, it is at so small a distance from their holes, that before you can come up to them they are gone. At night you have no more to do than to go into the mangrove woods with a torch, and you may take as many as you please, for by this light they cannot see their holes. You must be careful how you take hold of them, for with their claws they give a monstrous pinch. The negroes here are very dexterous at it, they tie them up in half dozens and bring them to the soldiers, who purchase them for a biscuit or two, or some such trifle, and either make soup of them or roast them.

I do not remember that in all my walks about the island I ever saw a snake, nor is there any other creature the least offensive or dangerous. I have seen one which had some resemblance to the racoon, but it is harmless and is very good eating. The iguana is to be found frequently in the gullies and in the woods on the banks of rivers, it is very like the lizard, but is very large; I have seen them near four feet long. These creatures are very often eaten by the French. The meat of them is as white as veal, and when dressed is an excellent savoury dish.

After being some time at Fort George, I made an excursion to La Moule, a place about N.E. from Fort George, and where a part of the 65th Regiment were quartered; it is situated near the sea side and is a pretty little town without any fortifications, except a small battery. In going to La Moule, I went through the town of St. Ann's, where was another detachment of the 65th, and through St. François, which had likewise a party of that regiment quartered in it. St. Ann's is a pretty large town, but it had not quite recovered from the distress it was in at the siege when General Crump visited it. St. François is but a small place. Both these towns have very good roads belonging to them where vessels may ride with safety, being sheltered by small long islands that lie before them. I thought the country all about very pleasant and agreeable, but it is not equal to the other parts of the island, either for the goodness of the plantations or the beauty of the prospects.

On my return to the fort, an officer of the 65th and myself agreed to go the north point of the island. For this purpose I had my canoe put into good order, and with two men to row we set off, going down the harbour and through the salt river, which parts the island. The river we found very pleasant while there was any wind, but when it was calm the mosquitoes and sandflies were enough to make one mad. When we got out of the river we were in the open sea, which was at this time rather too high to make our situation any way agreeable, and the wind blew fresh, but luckily it was in our favour. After shipping many seas and being in no small danger, we arrived before night at Port Louis, where is a battery of 12 guns and an officer and party of the 65th Regiment. We lay here all night, and the next morning entered our little bark and proceeded. The wind and sea were something abated, and we arrived at Bertrand Bay without any danger. We met with very civil and good entertainment both from an officer who was stationed here and from the French. This is a pretty little village and well situated close by the water side on rising ground. There is a small battery here. We remained three days, and then set off for Port Louis, but before we reached that place we encountered great difficulty and danger. The wind, after we turned a point of land called Antigua Point, blew directly against us. The sea was very high likewise, and we were for two or three hours unable to gain anything ahead, and what was worse, we were a considerable distance from the shore. The waves were every moment beating over us, the men were tired, and we could not get up to relieve them, it being very dangerous to stir in a canoe, especially when there is any sea. We could not venture to turn about to endeavour to regain the place we had left, for the waves coming against the broad-side would have instantly filled her. We had nothing left but to keep her head to the sea, and do the best we could. We made shift to give the men a dram apiece which gave them new vigour, and after a vast deal of labour we reached our port. I cannot describe the pain I felt all that night and next day from my face and hands which were in one blister from the heat of the sun and the salt water. We did not choose to leave this place till we were quite recovered from our fatigue and the weather more calm. On the third morning we re-embarked, and as it was very calm we soon entered the salt river, and arrived at the fort in the evening, where everyone was surprised to see us, for we had been given up for lost.

My next trip was into Capes Terre. I set off in my canoe across the bay and landed at Goyave, and then walked to Marigot, where I was very kindly entertained by my friends of the 4th Regiment who were now quartered here in barracks built for that purpose. Petit Bourg had proved such a burying ground to the regiment that they were obliged to leave it.

I had an opportunity while I was here of seeing a most extraordinary method of catching fish. About the month of November a small kind of fish resembling the sprat comes upon the coast in amazing shoals. On discovering these, two negroes, each with a cast net, go into a canoe, one standing in the head and the other in the stern. When they come among the fish, the man in the head throws his net and immediately jumps overboard and dives after it, and the man in the stern does the same. In a little while, one of them comes up with his net in his hand full of fish, throws it into the canoe, and then gets in himself; the other man directly pops up with his net full and does as the other did, and thus they go on till they have caught what quantity they please, What is very strange, they fish in this manner where the water is six or eight fathoms deep.

After remaining a few days with my friends, I returned to the fort. From this time to the giving up the island my time was spent as agreeably as I could wish. I never was the least ill, and therefore, could have nothing to make me dissatisfied with the place. The commanding officer, Captain Roberts, and all the others were extremely good natured, and we lived together in the most sociable and friendly manner.

In the month of June, 1763,[1] we were informed that a peace was concluded, and that the island and Martinique were to be restored to France. We directly set to work and embarked all our cannon and artillery stores on board the "Loyalty," an old very large cat.[2]

On the 2nd July, a schooner arrived with French troops, a poor miserable looking set of fellows. On the 4th, they landed and marched into the fort, and we marched out and immediately embarked. One of our men, by way of plaguing Monsieur when he struck the English flag, cut the halyards, and they were a considerable time before they could hoist their white rag. This, though very foolish and wrong, occasioned a great deal of mirth to our people. On the 5th, we sailed for Basse Terre. On the 6th, the French took possession of Fort Royal, and all the English troops embarked. The lower sort of French were exceedingly insolent to our people when they were embarking, though the others were most sincerely affected on our going away, well knowing the loss they would soon sustain.

On the 7th, all the English set sail for the island of Dominique, which was ceded to England. Our ship sprung so many leaks that with the greatest hard labour of everyone on board, we could not prevent the water from gaining upon us. On the 8th, we came off Prince Rupert's bay, but did not get in till the 9th in the afternoon, and but for the assistance we received from the men-of-war, the ship would have gone down before we came to anchor. Another ship was ordered alongside of us, and all the guns and stores were taken out immediately.

I went on shore at this place, but was so bitten by the mosquitoes that I was obliged to get on board again. There are no buildings here, except several huts where some English people live, who are but lately arrived, and sell a few goods. In a few days after this I went in a canoe two or three miles up a river to get some plantain trees for our ship. I met three Caribbs in a canoe in this river, who were killing fish with bows and arrows. I had the pleasure to see them strike several. They are so very dexterous at it that they will strike them at seven or eight yards distance, and though the fish is swimming very fast, and a foot and a half or two feet under the surface.

---

[1] By the peace of Paris in 1763. Among other conditions, England gave up the islands Martinique, Guadeloupe and St. Lucia; also the principal part of Cuba with the Havannah. In exchange she received the promontory of Florida and the countries east and south-east of the Mississippi.

[2] An old term for a collier.

On the 12th, I received orders to remain in this island with a detachment, but on my remonstrating, as I had been so long in Guadeloupe, another officer who had but lately come out was ordered in my place.

On the 21st, in the morning, we sailed out of the bay, and in the afternoon we lay to off Basse Terre, Guadeloupe.

On the 22nd, we passed close by the island of Antigua and lay to all night.

On the 23rd, about noon, we lay to off Basse Terre in the island of St. Kitts, and caught a very large shark, which came from under the ship and made a snap at the blade of an oar that was hanging over the boat's side. We baited a large hook with a piece of pork and he immediately took it. We had great difficulty to get him on board and much greater to kill him. He lashed his tail about with such violence that no one dared venture near him for some time, till one of the sailors with a hatchet gave him a nick that quieted him. He was 11 ft. long.

On the 24th, in the morning, we passed by the island of St. Martin and among other little islands, and in the afternoon took our leave of land. Nothing happened of any consequence during the passage but our being put on an allowance of water, and indeed nothing can be so horrid as the want of water on board ship, and if we had had a much longer passage we should have been in the greatest distress.

On the 29th of August I saw with the greatest pleasure and satisfaction my native land, after having been absent from it near five years.

On the 30th, in the evening, we came to anchor at Spithead. I immediately went on shore and remained till the 12th September, and then again embarked, on the 14th anchored in the Downs, and on the 16th weighed and arrived at Woolwich.

A few days after my being here, I received orders to join my company then in America. I thought this order rather unkind as I had been so long abroad. but on my application to General Williamson,[1] I obtained leave of absence till the month of August following, when I received a letter from the General at my father's in Huntingdonshire, ordering me to join immediately at Woolwich.

---

[1] Kane's List, No. 31. Lieut.-Colonel Williamson commanded the R.A. at the capture of Louisbourg and snbsequent operations till the capture of Montreal in 1760. He died a Colonel-Commandant 1781, at Woolwich.

(To be Continued).

"RECRUITING."

BY

H. O. ARNOLD-FORSTER, ESQ., M.P.

(A Lecture delivered at the Royal Artillery Institution, Woolwich, 16th December, 1897.

MAJOR-GENERAL J. F. MAURICE, C.B., IN THE CHAIR.

THE CHAIRMAN—Ladies and Gentleman, I do not think I have any occasion to introduce to you Mr. Arnold-Forster, whose name is familiar to you all (applause). Whatever differences of opinion may exist with regard to some of the points which he may bring before us, we are all very much indebted for the efforts he has made to draw the attention of the country to the necessities of putting the army on a proper footing (hear, hear, and applause).

INTRODUCTORY.

MR. ARNOLD-FORSTER—General Maurice, ladies and gentlemen. I admit that I am in an anomalous situation in the presence of a military society, and my ordinary attitude in the presence of soldiers up to the present time has been one of observation, and my endeavour has been to learn—not to attempt to teach—in the hope that I might avail myself of opportunities which I occasionally have of correctly imparting the opinion of soldiers to the great civilian class of which I am a member. On a previous occasion your secretary was kind enough to do me the honour of asking me to speak before this society, and I recollect that he invited me to address you on the subject of guns. I also recollect writing to him in reply that it seemed to me somewhat like an invitation to a layman to address the House of Convocation on the Athanasian Creed, and that the idea of addressing an audience in Woolwich on the question of guns was even beyond my ambition, or my conceptions of what it would be justifiable for me to attempt. But the subject you have asked me to speak about to-night is a different one, and for reasons which I think I can establish, it is one to which I feel entitled to invite your attention. I may say with regard to our chairman here, who has done me the great honour of presiding, that I hope he will not feel that he has, so to speak, to shepherd too bad a subject, and that such a doubtful character as I am, having ventured to criticise military institutions, ought not to be allowed in this building at all. I hope, and I have some reason to think, that he will put himself on a proper footing by criticising what I have to say, and showing that he, at any rate, is not carried away by my revolutionary ideas.

Recruiting Partly a Civilian's Question.

But as I said the question of recruiting does present a common ground to soldiers and civilians; it is a point on which they may meet, because in this country we are in a different position from foreign countries; the two worlds, the civil and the military, are not the same. In Germany and in France they are co-extensive, and everything that is civil at one period of its life goes through the military mill; but here they are two totally distinct worlds, and it is the object of the military world to introduce into its ranks a certain number of civilians, and as a representative of that civilian world, and having as much right of course to speak for it, as you gentlemen have to speak for the military world, I have felt justified in acceding to your invitation to speak about this question of recruiting.

The Present Condition of Recruiting.

I suppose the reason why that subject was chosen was that recruiting is not in the happy condition of a country which has no history. As long as recruiting for the army was in a perfectly satisfactory state it would have been certainly an anomaly to ask any one to discourse upon it; but unfortunately we are in presence of a fact which no one can deny, that recruiting is beginning to have a history, if it has not already had one for some time past (hear, hear) and that, that history is not altogether satisfactory. We are in the presence of the fact which I think even the most sanguine person cannot deny, that recruiting at the present moment is in a very bad way. There is a failure both in quantity and in quality in the supply of recruits for the British Army (hear, hear and applause). My own belief is—and it is supported by evidence much more important than my own opinion—that the limit of recruiting upon present conditions has been very nearly reached, if it has not absolutely been reached. And in presence of that fact and in presence of another fact, which is beyond dispute, that the time has come when larger demands will be made on the population of this country for the supply of recruits, we are face to face with a very serious situation indeed. It is quite true, of course, that a large number of recruits have been obtained and are being obtained for the army. I have before me (it is the only series of statistics I shall trouble you with) the figures of the recruiting for the last five years, and roughly speaking and omitting the hundreds, I find that there has been a progressive decrease in the numbers of men recruited, that in 1892 there were approved 39,000 men, in 1893, 34,000 men, in 1894, 33,000 men, in 1895, 29,000 men and in 1896, 27,000 men. I do not quote these figures to call attention to the fact of diminution, although that is important, but to justify my statement that there is still a large number of men to be got in the ordinary way, amounting to as much as 27,000 in a year.

The Quality of the Recruits.

But what I am concerned with is the fact that these recruits are not of a satisfactory character, and that they are not sufficient in quality. Now with regard to the character of the recruits, I should like to put you in possession of my reasons for stating that the character of the recruit is not satisfactory. In the first place, I will put the least significant and the least important reason, and that is my own knowledge derived from a frequent series of visits to the places where recruits are passed for the army, and from very many visits to the depôts and to the regiments into which those recruits are passed. Using my own intelligence as far as it is worth anything, I am not satisfied that the class of men whom I see at the St. George's Barracks being examined and passed as recruits for the army are the class whom we could desire to see in the front rank of the defensive and offensive forces of this country (applause). Adding to that very unimportant source of information others, I am confirmed in the view I take. We have had reports, some of them private and some of them public, from officers concerned in the business of recruiting, and I am sorry to say there is, I will not say a uniform tendency, but there is a large preponderance of opinion in the direction I have suggested, namely, that the character and stamp of recruits is not what we might desire, if we had anything approaching the ideal of an army.

The Terms we Offer.

And lastly—and I confess this is a matter which impresses me most of all—I am convinced that we are not getting the right sort of recruits for the simple reason that we are not going the right way to get them (applause). I do not know that I am a very profound believer in the application of strict logic to all that concerns human life, but I am a believer in logical processes to this extent, that I am convinced that unless you offer terms which will attract the good men you will not get the good men, (applause) and I am convinced we are not offering terms which are such as to commend themselves to the class of men whom I desire to see in the army (hear, hear). Now, in this matter, I do speak with whatever authority attaches to an ordinary civilian, and I put myself in the position of a person who is sometimes called upon to advise young fellows as to what their career should be, and I put myself in the position of one who has to think of the future of persons who are in his own family, and I say that from neither of these standpoints would it be possible for me to recommend a young man to undertake the career of military service under the conditions which are offered just now. My experience in that matter is not singular; we know perfectly well, that what is, I believe, a reasoned conviction with me is more in the nature of a fixed prejudice with thousands and tens of thousands of people, who are responsible for choosing a career for their sons or of those for whom they are responsible. I do not believe we are offering terms which ought to attract or which do attract the best class of our population, and for that reason I am convinced we shall not attract them.

"SPECIALS" AND C.O.'S REPORTS.

I would like to say a word here with regard to the question of "specials," and speaking to an audience of officers, I would respectfully venture to offer a word of advice about this matter. I know, of course, what is said about the value of specials, that very often they become excellent recruits. I know they are often very excellent soldiers; I know regiments in which there has been a very large percentage of specials and the officers commanding them have told me, that taking the regiments through, the specials are perhaps as good a sample of the regiment as any other men in it. Well, I sometimes think that officers put their ideals a little too low in this matter (hear, hear) and I believe that a good deal of harm has been done by the reports of inspecting officers and, if I may say so, of commanding officers with regard to the men they get. They put their datum line too low and the result is that year after year we are informed in the House of Commons that the condition of recruiting is very satisfactory, that the reports from commanding officers about the class of recruits they are getting are very good, and that they have no reason to be dissatisfied. I am the last to speak a word in anything but praise of the sanguine spirit which induces an officer to make the best of whatever materials he has, but I do feel that there is a responsibility resting upon officers in this matter, when they know that what they say will go beyond the limits of the War Office; because these matters are brought before the world as matters of authority on the statement of commanding officers before Parliament, and it is absolutely impossible for members of Parliament, without very extensive enquiry or very special knowledge, to combat a report which comes sanctioned by the "imprimatur" of the signature of the commanding officer of the regiment, or of the inspecting officer. I do sometimes wish that those very favourable reports, which to my mind do not coincide with the opinions which I hear frankly expressed by the officers in private, should be less frequently presented to us in the House of Commons, or in the public press (hear, hear and applause).

THE LIMITS OF RECRUITING AND THE EFFORTS OF THE WAR OFFICE.

Now, I said that we had nearly reached the limit of recruiting on the present terms. We have evidence, we have evidence which to my mind is incontrovertible on this point. Last session we had sanction given for the raising of several thousand men, and we know now that we are to have a large number of additional battalions—probably a large number of additional batteries—raised in the years to come. An effort has been made to raise the men, I suppose there are very few officers in this room who have not made themselves acquainted with the result of that appeal to the ordinary sources of recruiting, and are not aware that that appeal has not been satisfactory. I have already stated elsewhere, how far it has been met with a response. I stated and I stated correctly, that up till the middle of October last the net recruiting for the two battalions of the Guards, the Scots and the Coldstreams, was nil. Do not let me be misunderstood; I do not mean to say men had not been obtained, men had been obtained, but towards the new establishment of two battalions, after filling up the depôts and the establishments of the existing battalions, the number was none. For the Garrison Artillery, out of 3471—the number actually recruited to the good up to the beginning of November, was 225 men. That is out of 738 men who were to have been recruited during the year and out of 3,471. As to the Cameron Highlanders, the new battalions had been a little more fortunate, and up to the date when I obtained my information they had obtained 180 men but you will see that is a very feeble response to the strenuous appeal which has been made. And speaking here, I speak to men who know very well that there have been special efforts made to obtain these men. In the case of the Guards, there have been what I may call heroic methods taken to get the men into the battalions, a class of men have been taken as specials, who have never been taken as specials before, whole recruiting districts have been thrown open to the Guards which have hitherto been considered closed to them, and though I do not grudge the men to the Guards, I do very much grudge taking away the flower and the cream of the population which furnishes the recruits from the regiments which are localized in those districts (applause).

Lastly, with regard to the cavalry. I want to say a word a little later about what has been done with the cavalry, but I say here that if we are to have a very meagre establishment of cavalry kept up on its present basis, the methods which have been taken to recruit the cavalry and to stimulate the recruiting of the cavalry are deliberately calculated in my opinion to diminish our chances of obtaining good recruits and possibly to diminish our chances of obtaining recruits at all. I have heard it stated on an authority, which was to me very convincing, that the reports of the most experienced recruiting officers are to the effect that within 3,000 or 4,000 the limit of recruiting in the classes we ordinarily go to is exhausted, and I am unable to reconcile these facts, and many others with which I need not trouble you, with the statement which has lately been made by the Secretary for War to the effect that there is no difficulty experienced in obtaining men and that the condition of recruiting is satisfactory. I believe all the facts—the notorious facts—point the other way, and that the condition of recruiting is profoundly unsatisfactory, and that if we attempt to make this large promised addition to the army on the present terms we shall find ourselves confronted with the impossibility of obtaining the men at all.

How "not to Attract Recruits."

Now to me it is not a matter of surprise, not at all a matter of surprise, that we should fail to get recruits; to me the astonishing thing is that, on the terms we offer, we get as many recruits as we do, and on the whole that we get as good recruits as we do (applause). Of course it is superfluous in an audience like this to call attention at any length to the difference between a conscript army and a non-conscript army. In a conscript army everything is subordinated to what you conceive to be the ideal convenience of the working of the military machine. All other things are subordinated to that; you can dictate your terms to the individual, you can dictate your terms to the community, you can dictate your terms to society, everything must give way to the convenience of the military machine. But I would say in passing, and I think it is a thing not sufficiently dwelt upon, that in countries which are in that happy or unhappy situation, advantage is not taken of the fact, and we find that in those countries an amount of attention is paid to individual idiosyncrasy, to regimental tradition, and to military feeling, which contrasts most favourably with the state of matters in this country (applause). I know something—not as much, of course, as many a man in this room does—of the German Army and its organisation, and I say that the very last mistake they make in the German Army is to underrate the value of individual idiosyncrasy, regimental feeling or military tradition (applause). When you pass from a conscript army to a non-conscript army like ours, surely it must be obvious to everybody that keeping in view the object (which after all is the principal object,) the efficiency of the military machine, it can only be obtained by paying perpetual regard to the feelings, idiosyncrasies and ambitions of the individuals who are to form your fighting force (hear, hear and applause).

I should like to ask as I have asked befor, and as I intend to ask again, whether we are paying as we ought to pay and as we know we ought to pay, sufficient attention to these considerations, whether we sufficiently devote our attention to making the career of arms one attractive to the kind of men whom we want to see in the army.

Our Advantages as a Nation and how we Abuse Them.

We have very great advantages ; we start with immense advantages in this country when we offer the career of arms to a young man. We have, I believe, and I think there is no one would contradict me, an innate love of soldiering and adventure in this country (applause). I suppose there is no youth worth his salt who has not at some time of his life made up his mind to be either a soldier or a sailor, or both, and that is no doubt a great advantage to start with. We have also the great density of our population ; we have the enormous competition for occupation of any kind which is driving people out to the four quarters of the globe, which is filling our great cities with unoccupied men, and which must necessarily send into the army scores, hundreds, thousands of men, if only we could assure them that the prospect we hold out to them was by one degree better than the prospect of neglect, misfortune, and starvation which dogs and awaits so many of our population. Then also, we have the great treasure of the splendid tradition of our army. We have the record of its great exploits, we have a tradition which has been fostered and fostered enormously to the advantage of the army and of the nation by the officers of the army and, in less measure, or, perhaps, in equal measure, by the historians who have written the accounts of what our army has done, embodied in books such as Napier's great works. We have that tradition going through every rank of our army, and nowhere stronger, nowhere more fruitful in the work it does than in our regimental organisations.

Well, now with all these advantages in our possession I ask, are we taking advantage of them for the benefit of the army? As far as I can see so far from taking advantage of them, there is much evidence that leads me to believe that we are neglecting them, that we are discouraging them, and that we are making believe that we can do without their assistance (applause).

The Enlistment of the Recruit.

I look, not at the recruiting placards, there is probably no one in this room who has less respect for a recruiting placard than I have, and I am sure that is not much, but I look at the real facts as they are widely known to our population. I go to St. George's Barracks where two thirds of the men are enlisted for the British Army. What do I find? I find a place of contemptible exterior and still more contemptible interior, a decayed tumble-down George the Third Barrack, and in the cellar of that barrack I find the great avenue to the career of the soldier which we offer. I say that that is not right; I say that that is not the way a young man, with his career before him, should be introduced to that career (applause) and I say that is not the way by which men are introduced to any other army, or to any other branch of the military services in this country with which I am acquainted. The ceremony of swearing in the recruits in the German Army may have, perhaps it has, I do not think so, its grotesque side; I do not know, but I do know this, that anything which, to use a common phrase, "gives a man a good conceit of himself" when he puts on his uniform and takes his oath is all to the good. I say that in the Royal Navy, in the Royal Marines, there is no such distressing ordeal to be gone through as the entry of a soldier into our great recruiting centre in the St. George's Barracks. I would like to see that barrack done away with; I should like to see proper and reasonable depôts put up where a man could go in holding his head high; you could if you like have a back door for those who wished to enter by it, but still let it be advertised to all the world that a man is not dropping his career but beginning his career when he enlists in Her Majesty's Army (applause).

"A Home for the Soldier; A Lesson from the Royal Marines."

I suppose if there is any one thing more than another that comes home to a man who is going to be a soldier, and who knows or cares anything about soldiering, it is the choice of a regiment. In a feeble sort of way we know that officially, because we have heard a great deal that is true and a great deal more which, I think, it exaggerated, about the value of the territorial system, a system to establish which we have undone,I think a good many good traditions (hear, hear) in order to found a good many other traditions which may be good, but which, perhaps, are not all equally historical and not equally fruitful. Still in the territorial principle we have recognised the idea that it is of enormous importance to an individual that he should be allowed the choice of the regiment in which he serves. We have already had some experience of how that theory works out in practice. I am not going to go back to what has been done in the past. I regret greatly that it should have been thought necessary in the cause of efficiency to confuse (and they were confused), existing regimental traditions (hear, hear). I believe it was done to an extent quite unnecessary, and has not been of any great value to the service. But when I see that we are promised a still further departure from what I believe to be the true course, I think it is greatly to be lamented, and when I heard we are to have another break up of the regimental organisations, and that the regiments which possibly have by this time accommodated themselves to their new classification and learnt what it is that they ought to learn, and learnt what they ought to forget and what it is permissible that they should remember, should now be called upon to make another effort and to divide their affections over two more battalions, I confess I think a great mistake[1] is being made (loud applause)—

And if I wanted a proof of this tendency to neglect what seems to me to be the A.B.C. of all truths with which human nature is acquainted, I should find it in the recent arrangement which, to my knowledge is acting detrimentally, and is bound to act detrimentally, with regard to another branch of the service, I allude to the cavalry. Now, if there be one branch of our service more than another, which to the knowledge of every soldier, depends on the individual character of the regiments, it is the cavalry. You may take the ornament on the uniform, the badge and motto on the colours, you may take the colour of the horses, the name of the regiment, everything stamps that regiment as a unit, a thing in itself, with a past, present and future. And men, as you know, and as I know, enlist over and over again, not for the cavalry but for the regiment of cavalry (applause). When I am told that something is to be gained so vital, so valuable, that it is worth attaining by the process which has recently been introduced into our cavalry regiments, I confess I cannot accept the statement. What has been done we all know is this, that a man if he desires to enlist, as many men do desire to enlist, for a particular cavalry regiment, I do not wish to be invidious, but I will say the 1st Royals or the 17th Lancers, or the 10th Hussars, or any other regiment you like, he goes into that regiment because he knows about it as his father knew about it, and because his friends know about it, and because he has read about it, and I know this is so because in my mind's eye I have clear examples of every one of those generalisations I have made. When a man desires to serve in a particular regiment what is he told now? that he is told he cannot enlist in that regiment, that if he does join it within a month he may be turned out of it, that he enlists for a corps of Lancers, or Hussars, or Dragoons, and that he not only may be passed on, but in all probability will be passed on willy nilly to some other regiment before six months of his service have gone. That does seem to be a revolution that requires an amount of argument to sustain and justify it far in excess of anything I have yet heard put forward in support of this new fad (applause).

---

[1] The recent speech of the Secretary of State for War lends itself to the construction which has been placed upon it by some, namely, that the War Office intends to group existing battalions in sets of fours, to make "four battalion regiments." There is, however, some reason to believe, and every reason to hope that only where the new battalions are added to existing regiments is the "four-battalion" scheme to be inflicted on the infantry.—H.O.A.-F.

The Infantry Recruit—Characters.

I have not yet quite done with the subject of how we appeal to individual men. We take a man and we enlist him in a battalion. We have not had him a twelve month before we move him out of that battalion. There may be reasons—and I think I know what are supposed to be the reasons alleged as in favour of that process—but I have never yet been able to ascertain with what principle of human nature or upon what principle of common knowledge that practice coincides. I have never yet seen why it should be necessary to enlist a man in a battalion here in England, and within a year to transfer him to a totally different battalion which, barring the fact that it has the same name, or has recently acquired the same name, has nothing whatever to do with that battalion. Nor can I understand in what way that is a wise, and from a moral point of view, an economical measure. There is another point to which I should here like to refer. I feel there is a great loss of power in not demanding any sort of character from the men who enlist (applause). I know there are two views about that, I know there is a very strong view in the direction which I take; I know there is a view also which many have expressed, and which is seriously entertained by them to the effect that you cannot get better soldiers than what Lord Charles Beresford designated the other day as the "scallywag class." Now there are two classes of scallywag; there is the class of of scallywag which Lord Charles Beresford belongs to and the class he does not belong to. Take all of the first-class you can get, take all the devil-may-care fellows, the fellows who do not care and who have not made their plans for the future. But do not take the bad lots—the men who are bad characters and known to be so, because if there be one thing more fully ingrained in the English character than another it is a reluctance to see men you are acquainted with, children you are responsible for, mixing with men and boys of bad character (loud applause). I do not know that we are better or worse than our neighbours, but anybody who knows anything about English character, from the highest to the lowest, and I believe it even more strongly about the lower than the higher, is aware that there is that feeling ingrained in their character. Nothing I am convinced, has done more harm to the army, and nothing has done more good to the navy, than the difference in practice in these two matters. I know there are officers who have made strenuous efforts to insist on the production of some sort of character by the men who join the regiments, and have not been encouraged in that pursuit by the War Office. But I am of opinion that it would be a great advantage, that it would put the army more in harmony with English traditions and give us a better chance of obtaining good men, if the present haphazard system, which to put it mildly, does not enquire into the character of the soldier, were done away with. I had an odd observation made to me the other day by an officer germane to this subject. He said it seemed to him that nothing could bear so strong a testimony to the high character of the army now serving as the fact that so very many thousands of men were eliminated from the army before the close of their services as being bad characters. He said to me that an army which has discarded so many bad characters must have an exceedingly valuable residue. But I must admit that argument did not strike me in the same light, and I think that any other society in the world which based its claim to character on any argument of that kind would be singularly fortunate if it managed to retain the esteem of society.

THE FATE OF THE DISCHARGED SOLDIER.

I am not going to weary you because you are familiar with the fact, that the after history of the soldier is often a bad one. I will not trouble you with numerical details as to exactly how far our workhouses are filled with our discharged soldiers. There have been various opinions about the matter, I have my own strong opinions, and I have taken immense pains to form them, apart from the information contained in the official reports, which I do not value a straw. I base my views upon information which I regard as accurate, information which I have myself obtained from the actual pauper centres themselves, and which I do believe in (applause). But really this is not a matter for any statistics one way or another. It is, perhaps, to a certain extent, but the exact figures are not the important point; the important point is, what is the public opinion ? The public opinion is absolutely fixed and clear on this matter ; you may go, as I have been, to Whitechapel, to Belfast, to any big town, anywhere you like, and you will find the same opinion, the same error if you like—I do not think it is an error—and you will find the same rooted belief, that the army is not a 'career,' and that it is ten or twenty chances to one that it will lead to poverty and it may be to the workhouse. And as long as that opinion prevails, and as long as there is enough justification in fact to support it, you are not doing justice to the country and you are not doing justice to the army (applause). I confess I saw with shame an appeal which was made the other day to employers of labour by the Government that they should as a matter of—I do not know what to call it —shall I say of charity, or condescension, or fellow feeling, or a desire to help a lame dog over a stile, that they should be so good as to employ the reserve men in their businesses. No one more fervently desires such a consummation than I do, but does anyone who knows anything of business matters in this country believe that an appeal of that kind is going to be taken seriously ? We all desire to do a good turn to everyone who is in distress, but a reserve man will be taken on in a business because he is wanted in the business, and he will not be taken on to relieve the War Office of its duty, or to perform the work of the relieving officer (applause). And let me say this, that I believe firmly that this idea about Government employment of discharged soldiers has been misunderstood. I have myself taken an active part as far as I have been permitted to do so, in endeavouring to increase the amount of employment given in Government offices, hitherto we have been met with a stubborn resistance on the part of every department, except the War Office and the Admiralty. Soabsurd, if I may say so, is our governmental organisation, so cast-iron are the divisions between the departments, that I remember going with a deputation of gentlemen to the Postmaster-General asking him whether he would not consent to carry out the recommendation of commission after commission, and give certain specified employment to discharged soldiers. What did he say? That personally he was convinced it was the right thing to do, that personally he was strongly sympathetic with the object in view, but that as Postmaster-General, he had to consider the feeling that would be elicited among the employées in his department if he were to take this departure which would deprive a certain number of other persons of the employment to which they considered they were entitled, but to which they had not the slightest legal right. As long as you are met in that way no doubt you can get no further; if this matter is not to be regarded as a question for the Government as a whole, you may depend upon it that the promises which are made to us now, and which are a repetition of promises made last year and the year before, and every year as far as my recollection of blue books goes back, will end exactly where those promises have ended, and will produce no result whatever. But when all is said and done we must not deceive ourselves; the amount of Government employment in this country under the most favourable circumstances, is far short of the demands which would be made on the Government if we were to expect to get employment for all short service soldiers discharged into the reserve. That is not possible. I say that as a caution, because we sometimes see in the Press and hear elsewhere suggestions that Government employment ought to be granted to every discharged soldier. All I want to say as a caution is that although we wish to see the employment largely extended, it is a mere delusion to consider that it can be a solution of the question.

A Plea for more Colour in the Soldier's Life.

One more point, it is a very small matter, but it is one that does commend itself to me as an important matter. It seems to me that we are not doing enough to remove the grey tint of military service. After all, military service is hard, it is dangerous, it is not always exciting, and unless we bring into it the moral encouragement, excitement, and interest which can alone make it palatable, we shall be doing harm to the service. Even in such a small matter as the question of uniform, I think we have neglected those great truths. To begin with I have never yet seen why the tailoring department of the War Office should have been allowed to carry out all the changes with regard to uniform which it has decreed. I have paid some attention to this question, and I believe that the plea upon which these changes have been justified, the plea of economy, is an absolutely unworthy, and an absolutely misleading plea (applause). I find that there are very few private soldiers and a very few friends of private soldiers who do not attach, just as I suppose any other member of the community attaches, much importance to the question of uniform. And when we take together and put in a focus the whole sum of advantage which has been supposed to accrue to the country from the changes of uniform, the assimilation of uniform—I find it rather like the tail of a comet—you can compress it into a tea cup. I think too a great deal more might be done to revert to reginental distinctions in the matter of uniform without any very great harm to the service (applause).

A SUMMARY.

I have now merely tried to put in a brief way some of the things which have occurred to me as not likely to encourage the best class of recruits to join the army. I do not think there can be any doubt that whether or not I have properly diagnosed the causes, the results are pretty much as I have stated them to be, and that we are not getting the right class of man into the army. He would be a very bold man who would pretend that the soldiers we are now enlisting in our infantry regiments, or even in our artillery batteries are a fair representation of the manhood and strength of this country (applause). It is an absurdity; everybody knows they are not. And in an army like ours, which must always be a small army, which must always be a campaigning army, and almost always campaigning under difficult circumstances, it seems to me a very low ideal which permits us to be content with anything less than a true representation of the manhood and physique of the country.

SIR A. HALIBURTON ON THE BRITISH SOLDIER.

Now I do not see that at present we are likely to get much further, unless there be a great change. I see that we have recently been told what is the official view with regard to the character of the recruits, and why we should not desire a change. Recruits we are told, and the passage is quoted with approval by a very great authority who has recently been enlightening us. "Recruits, except for the Royal "Engineers, are now drawn from the strata of poor workmen, dissipated "idlers, and rolling stones. It would not be desirable to hold out any "large monetary inducements for the purpose of getting young men over "20. If you dip into that stratum you will frequently get very undesirable men." Now I call attention to that; that is the opinion of Surgeon-General Don, quoted with approbation by Sir A. Haliburton, and I say that if you are going to start from that stand point, if you are really to suggest that you dare not take men of 20 years of age because they are so bad when they are 18, that if you wait till they are 20 they will be irreclaimable blackguards. You will never get a proper class of men into the army.[1] I have never been able to see that the comparison between the past and the future in this matter is of much value; I have been told on very high authority, that it is a matter of congratulation that the character of our recruits is higher than the character of the men in the Peninsular War. Well, I am rejoiced to think it is, and I think it is a great source of satisfaction; but really I would, even at the sacrifice of a little of that excellent moral character, which undoubtedly our recruits possess, be pleased to have in our regiments some of the class of men who fought in the Peninsular War (hear, hear, and applause). Really I do not think there is much to be made out of that argument; the world has gone forward since the Peninsular War, and in every rank of life there is now a totally different way of looking at the situations which life presents, a different way of acting, thinking, and speaking; and if you could not point to progress of that kind in the army as well as in every other branch of society, civil and military, then we should indeed have an army of which no man could be proud.

---

[1] Surgeon-General Don has since explained that I have misunderstood his meaning in the passage quoted.—A-F.

A Stupid Fallacy Exposed.

I have noticed that the same authority I quoted just now, and other authorities of equal and possibly of even greater distinction, have drawn attention to the fact that the standard of height in our army is higher than that of foreign armies. Well, let me repeat once more that this argument, resting on a comparison of standard, is illusory, that it is a mere deception, and I cannot say why it is to be trotted out again. The standard in our army is the standard which is meant to exclude, and you lower your standard to 5 feet 3½ inches in order to keep out men below that standard. In the German Army the standard is 5 feet 1 inch. Why? Because you want to get everybody above that standard into the army, and you do get everybody above that standard into the army. If you want to make a comparison of any value at all between a foreign army and our own (which, by the way, I think is quite irrelevant, because our circumstances are so different) you would have to take in this country every man not physically incapable above 5 feet 1 inch, and see what the standard came out at then. You would get all the young fellows in bicycling clubs, all the men who hunt, the men who row, and the men who ride; you would get the whole pick and flower of our population, and you would, of course, get such a magnificent result that we need have no fear at all for the quality of the material. But, as I say, what happens in a foreign army is that you take every man above 5 feet 1 inch, you put the smaller men into the train and subsidiary departments of the army, and the more physically competent men into the combatant ranks. I do think it is time we had heard the last of that argument which has no basis in fact, and is quite illusory (applause).

The Lines on which Reform is Possible.

Now I am sure I have said enough to have made clear to you what, to my mind, are the lines on which the relief from this intolerable situation should be sought. We ought, in my opinion, first of all to consider the individual quality of the man; we ought to regard the ambitions and desires of the soldier. We do not do that. I was speaking just now, we ought to give a man a career or an introduction to a career. Perhaps it is known to some of you here, that I have advocated, following the lead of many persons much more qualified than myself, a change in the conditions of our service, greater elasticity in the conditions of service, a long service, a short service, according to the conditions of the place in which a man serves.

The Terms of Service.

I notice it has been said that long service is a thing of the past. There again we are in the presence of one of those "incompatibilities" which my reason cannot get round at all. I do not know what it means when I am told that long service is dead, I do not understand it because I look round and I find that the whole of the navy, the whole of the marines (hear, hear) and the whole of the Household Cavalry and a large number of other men serving in the army, are all enlisted for long service; and I have never yet heard that those branches of our offensive and defensive forces are so conspicuously inferior to those who are enlisted on a short service term, or that they are not worthy to be counted amongst our effectives (hear, hear, and applause).

Depôts and the Secretary of State for War.

I have been told that there is something essential in the idea of sending men about from one battalion to another, and that there is something so valuable about this linked-battalion system, that it is quite impossible that it should be changed. I believe the linked-battalion system is exceedingly bad for the recruit and, what I desire is that the whole system of training recruits should be altered. The Secretary of State for War has said a very remarkable thing with regard to this question of the training of the recruit. He has said that the depôt system, which to my mind is the ideal system of training the recruit, is wrong and produces bad results. He says "A depôt, large enough to support several battalions abroad, means in the first place an uprooting of the territorial principle, and secondly entails a concourse of young, untrained and indifferently disciplined soldiers, with a staff of heterogeneous officers proportionately smaller than the staff of a properly organised battalion. I am assured, he says, on the highest military authority, that service in such depôts is demoralising both to officers and men, and that the recruits trained in them compare unfavourably with battalion trained recruits." Well now, to one who holds, as I do, that depôt training properly conducted is incomparably the best way of training men, that statement came as a surprise, and it came as a greater surprise because I knew that by far the best drilled infantry—I say it in the presence of any infantry officer we have here—the Royal Marines, are all drilled in a depôt. I know that depôt well, and I have seen the men turned out from it. I know that all the men of the Royal Navy are drilled in a depôt, all of them. I know that all the men in the Guards, although on a slightly different system, are drilled in a depôt; and again, on a slightly different system, the whole of the men of the Royal Artillery were, till the other day, passed through a depôt, although I admit there was a distinction between a depôt of the Royal Artillery and a depôt of the Royal Marines. I am at a loss, therefore, to understand what are the facts which justify a broad assertion of that kind that a depôt-trained recruit is an inferior soldier (applause). I readily admit that a man drilled as men are drilled in our present infantry depôts is not a well drilled soldier.

Learning a Trade or another Lesson from the Royal Marines.

But I would take yet another lesson from the Royal Marines. You want to get employment for the men. What happens? They do not get it after they leave, you know they do not get it. I have over and over again looked through the employment book of the Royal Marines. The difficulty in their case is not to find men to employ the discharged marines, but to find men to take up the employment offered. Why! The marine is taught a trade and an occupation. In the marines, the boots and the clothes for the whole corps are made, and the barrack repairs are executed by the men. We are told that we are going to have instruction given to men serving, that they are to attend technical schools and so on. Well, what will happen? The plan will not produce any appreciable result whatever on the after life of the men. Moving about as our troops do on their present terms of service, we may dismiss from our minds the idea that there will be any serious result except in individual cases, or that under the system the plan of paying fees or giving assistance to soldiers attending technical classes, will result in their really learning a trade. The whole system must be a very different one. We find another very important thing in the marine depôts, namely, that every soldier has a home. I believe too much importance cannot be attached to that question. The marine recruit leaves his depôt at Walmer, and he goes to the Royal Marine Division at Devonport, Portsmouth, or Chatham, and to that Division he belongs to the end of his service. What happens? He goes away three years on a cruise, comes back with a certain amount of money in his pocket, what does he do? He goes into the sergeants' mess or the privates' mess room, and finds his old comrades there, the old pictures, the old chairs, and the old accommodation. He goes round into the institutions connected with the barracks, and finds his wife and the wives and friends of his own companions, all there ready to receive him. And what is more every farthing spent on the decoration and improvement of those divisional quarters endures for the benefit of the men of the Division. I believe that at this eleventh hour enquiries have been made by the War Office into that recondite subject, the organisation of the Royal Marines. I noticed that no marine witnesses were ever called before the Wantage Committee, not a man, and I believe I am correct in saying that only within the very last month have the authorities gone so far to enquire seriously into the organisation of the Royal Marines, and to find out why it is that the Royal Marine service is popular, and why enlistment in the corps is not stagnant (applause).

What we must Offer to the Recruit.

I will not occupy your time much longer, but I should just like to complete my argument as it presents itself to me. I think we require for the interest of the recruit a long service term, or the opportunity of long service, which gives a career, and the option to a man to obtain a pension if he desires it (hear, hear). We must also have a short service term in order to give us a reserve. And I believe anyone who works out that problem will come to the same conclusion that I have come to, namely, that if you are to get men to devote themselves to only three years service in the army, you must take them very young indeed; and that if you take them very young you must, as Lord Lansdowne has very justly and truly said, treat them as boys until they become men as they do in the Royal Navy. That doctrine, if accepted, will no doubt bring about the consequence which is obviously the logical development of enlisting boys, to have schools for training them if we are to have any success.

The Question of Pay.

I believe that pay is a very small matter in this question, I mean the initial pay, but that pay later on is a very important question, and I want to see the plan which is so much in vogue in the army of giving gratuities for various classes done away with, as far as possible, and the plan in vogue in the navy and marines substituted for it, namely, that of giving men additional pay for every accomplishment they acquire (applause). There is no discontent in the navy or marines on account of one man getting more than another; a man says " very well, I am not as good a man as so and so is, because I have not done this or that," and there is always a chance for that man to do something better and earn a permanent addition to his pay.

How to Treat the Soldier.

The remarks which I have made have been, if not precisely vague, in a sense superficial from my own point of view. I feel that this is a question that cannot be properly treated in a few stray sentences; in every branch of it there is a subsidiary branch quite apparent to my own intelligence, and I am sure infinitely more apparent to the intelligence of those who are dealing with these matters every day. But I would say, in conclusion, that to my mind the great error is that we do not fairly realise that at present we are not dealing with our soldiers as men and human beings, endowed with the same instinct and feelings as ourselves. Please do not misunderstand me. I believe I am the last person in this country to make that observation about the officers actually commanding. I have had the privilege of seeing a great deal of our troops and a great deal of the officers who command them and I think there is no person in this country who is less likely to make the mistake of believing that the moral side of the soldier's nature—and when I say the moral side, I mean as opposed to the mere physical side—is neglected by the officers. I believe the time the soldier spends in the regiment is probably often the best time the man ever spends in his life, and that most of whatever good he gets, is owing to the care that is taken by his officers that he shall spend his time well, and to his own advantage, I do believe we are wrong in our treatment of the soldier's life altogether, we are not regarding the personal element enough.

What a Man will Die for.

After all we require men who have to undertake the hardest task in the world, and that is to die for an abstraction, to die young, and often to die "without any gallery." In this country, the last-named is a qualification we are happily possessed of to a very large extent, the readiness, I mean to sacrifice our lives without any immediate observation being directed to our exploits, and without the certainty that anyone will even be aware of the sacrifice. It requires certain rather high qualities of the mind to make that sacrifice possible, and in our past history in some way or other, we have managed to insure that they shall be possessed by our soldiers. As far as my study of this matter goes, and of course it is not as valuable as that of a man who has had to face the trials himself, a man will die for various things. He will die for his religion; he will die for his country, he will die for his womankind, he will die for his duty. He will even die sometimes for fear of an excessive and brutal discipline, such a thing has happened, not seldom in the history of military operations. You may remember the remark of the sea captain, who threatened that if his crew did not take the French ship, he would "flog them every one." And that analogy is not without its corresponding facts in the history of arms throughout the world. All of these things he will die for, and, above all, or rather not above all, but in addition to all these things, he will die because of the tradition of the regiment, or of the service to which he belongs (applause). Reading, as I did the other day, a very simple, a very straight-forward, but to me a very moving and interesting book, the life of Colonel Ewart, of the 78th, I understood, as I never understood quite so clearly before, what the life of a regiment means to the man who serves in it. When I read the account of the feeling in that regiment between man and man, when I read the account of the sympathy between officers and men, and when I read what that sympathy and that knowledge meant on the day of the attack on Lucknow, then I understood what is the value of the perfection of regimental feeling which so long existed, and which, in so far as it still exists, is one of the greatest powers, the best possessions in our army (applause). All those things to which I have referred are motives which will support a man in the time of trial. But do not let us deceive ourselves; unless we have one or more of those motives we shall not get men who will serve us when the time of trial comes (hear, hear). I have a great regard for my countrymen, who all come from a great stock; but we must not put too great a trial on materials which are not capable of bearing them. There are young fellows passing into the army now, I know them, I see them coming in, and have spoken to them after they have gone in; they have, in the ordinary sense of the expression, no abstract ideas at all, their idea of their country is hardly an abstraction, their idea of their duty is a thing not yet born in them; in many cases their idea of the regiment in which they are going to serve is a thing entirely beyond their comprehension, a mere catchword and a name, something as yet outside their whole experience. You can implant all those ideas in their hearts, you can make them devoted to their regiment, you can teach them the meaning of their country, the meaning of their cause; all these things will help to develop in them the magnificent qualities of the soldiers we have so often had to deal with in the history of our country.

What a Man will not Die for.

But unless you do all, or some, or one of these things, you will have a failure. And to my mind there is a great danger at this moment of those who are in authority over us, forgetting that there is one thing a man will not die for, and that is ninepence a day.

Conclusion.

That, gentlemen, is a summary of my conclusions, that is the main point I wish to try and put before you; and I hope that at anyrate I shall on that point have received the agreement, and I believe I shall receive it, of gentlemen who have had the honour of commanding Her Majesty's troops (loud and continued applause).

DISCUSSION.

Col. R. D. Eliott-Lockhart, Colonel on the Staff Commanding R.A., Woolwich, bore witness to the value of a Depôt system for R.A.; as a major and lieut.-colonel in India he found drafts from depôts generally good, and as C.R.A., at Woolwich, received only one complaint and that was made in error. In 1895, when done away with, the Depôt Batteries were doing most excellent work as a purely training school, and every recruit was getting sound average instruction.

With reference to the number of fraudulent enlistments that take place he suggested that the Recruiting Officer should be assisted by the police. The majority of the offenders are or might be well known, and the presence of a policeman in the neighbourhood of a recruiting office would probably be a useful deterrent.

Captain E. E. Norris, R.A., having been adjutant of 1st Depôt Division Field Artillery while some 8,000 recruits passed through it, found that about 10% deliberately enlisted, giving up other employment and coming straight from their homes to do so, and these generally joined well dressed, with good boots, collars and ties; about 30% enlisted willingly but did not do so until out of work, though they had often contemplated joining the army; another 20% enlisted willingly but had never thought of doing so until they were out of work; the great majority of this 60% were excellent recruits. The remaining 40% were driven to enlist by hunger; they were mostly in rags and the greater part were bad characters. A book was kept of the men thought likely to prove unsatisfactory and at the end of three months more than 75% of their names had disappeared owing either to desertion or proof of fraudulent enlistment. Capt. Norris thought that, in order to increase the "10% class" of willing valuable recruits, there must be a large decrease in the "40% ragged class," and recruiting officers should be encouraged to refuse to enlist men of the latter class; the recruiting sergeant has to forfeit his "bringing money" if a man he brings proves to be a fraud, and Capt. Norris thought he might be fined 10s. 6d. for enlisting a fraud who turns out to be such very soon after he enlists.

Lt.-Col. H. Kilgour, Staff Officer for Recruiting, Woolwich District, spoke of the effect that prospects of non-employment when in the reserve have on recruiting; he thought that the Army Poster as displayed is very misleading, take for instance the Post Office and railway companies; in two and a half years he had been offered seven appointments for reserve soldiers in the Post Office, and of them the largest pay offered was 10s. a week.

The railway companies have not asked for a single man in two and a half years, though bi-monthly lists of reserve men desirous of and recommended for employment have been sent to them. He found on enquiry that soldiers only get employment on the railways by concealing the fact of their belonging to the reserve. After giving instances of difficulty of getting employment in government departments, Colonel Kilgour said he thought there was room for another Corps of Commissionaires for reserve soldiers, to be run on the same lines as Sir Edward Walter's but managed by the War Office, and felt sure that like its prototype it might be self-supporting and at the same time prove a valuable means of employment for the reserve soldier and thus an aid to recruiting. He concluded by assuring Mr. Arnold Forster that the recruiting offices at St. George's Barracks were not the worst in the country, and invited the lecturer to visit the Woolwich establishment.

Lt.-Col. F. A. Yorke, R.A., Assist.-Commandant R.M. Academy, who was a recruiting officer in S. Ireland during a period of great disturbance, spoke of the extraordinary difficulty he found in getting recruits; he made enquiries of the parish priests, Protestant clergy, resident magistrates and heads of police, and from each he learned the same story to the effect that a father objects to his son going into a profession from which he will return at the end of seven years without any employment and no better fitted to get it than when he leaves home.

COLONEL A. E. TURNER, C.B., A.A.G., R.A., said: General Maurice, ladies and gentlemen—I have been asked by my almost life-long and valued friend, General Maurice, to join in this discussion, and I can refuse him nothing, but I must say I do so with extreme reluctance, for being an official in the War Office and therefore a factor, although I must admit an infinitesimally small one, in the administration of that department which is now being arraigned before the public, I hardly think it prudent for me to open my mouth on the subject. I must, therefore, ask you, ladies and gentlemen, to receive what I say not as an expression of opinion, nor an exposition of views, but merely an attempt to lay before you in as few words as possible the circumstances which have led up to the present method of service, to show you by a few statistics—very few indeed, for statistics are hard nuts to crack at this time of the evening (hear, hear), the results of that system of service, and then to state that which is considered to be an inducement to a man to join the Army.

We have lately read a very able article by Sir George Clarke in which he writes that the requirements of the Army have not been properly laid down by any government. I hardly think that that is the case. Our requirements seem to me to be three in number; First we have to keep up an army at home, which, with the Reserve called out aided by the Auxiliary Forces, is sufficient to repel an attack on the part of the greatest number which France or other foreign nation, under favourable circumstance to themselves, might throw on our shores; Secondly we have to maintain and feed our garrisons abroad; and Thirdly, we must be able, at any time, to send a small force abroad, without calling out the Reserve, to take its part in the small foreign wars abroad in which we are so constantly involved, and also to create or supplement on emergent occasions a garrison abroad.

Now the strength of our army, at home, is at present 220,034 men, of whom 102,811 are abroad, and it is for that number that we have to obtain our annual supply of recruits.

If you will allow me, in a very few words, I will just run through the state of the army at different periods since Waterloo. That seems a very big order, but I really mean a very few words. After Waterloo the Army languished rapidly, and in 1821 it consisted of only 101,000 men all told, deducting the troops of the East India Company, and of these 50,000 were at home. This state of things went on until the year 1847, when there were rumours of Wars on the Continent which resulted in the great Revolutions of 1848. The people of England then became most seriously alarmed about the condition of the Army, and their anxiety was not relieved, as you may suppose, when the Duke of Wellington said before the Commission of Sir John Burgoyne, that we could not put 5,000 men in the field without robbing every Garrison in England, and without leaving even the Queen's Guard without a relief! So that you see the Army has been in a much worse state than it is in now. He suggested that the cure was to embody 150,000 Militia as had been done in the Peninsular War, when in the year 1812 no less than 214,000 Militia were called out and embodied. This remonstrance of his led to a certain increase of the Army, and in the time of the Crimea, in 1854, we had an Army of 140,000, of whom 71,000 were at home. We all know what magnificient battalions went out to the Crimea—how they fought at Inkerman, at Alma, and at Balaclava, and how they utterly wasted away during the Winter of 1854-55, through the miserable administration of that period when the commissariat and supply of medical comforts completely broke down. There was no Reserve whatever to replace them, and the only means which could be adopted was to strip the battalions at home of their soldiers and send them out, also to despatch a number of boy recruits who died like flies, and to raise a foreign legion. Then came the Indian Mutiny, and after that the amalgamation, and in 1860 the strength of the Army was 235,852 men. Then came in 1870 the astounding overthrow of France by Germany, and the triumph of the new system. It is a very old system in Prussia, and was begun after the disaster of Jena, in 1806. In 1870, Germany completely crushed France. The first time the troops really met, was in the battle of Wörth, and here stood the flower of the French Army, old war-tried soldiers of considerable service, most of whom had come from Algiers, and a large number of whom had fought in the Crimea. The circumstances of the fight were curious; whenever the French came close at hand the old soldiers overthrew the young ones, and as you will recollect one charge of 1,500 Turcos threw back the whole of the front of the 11th Corps through Elsasshausen into the Niederwald, but the French had at last to yield in face of the steady discipline and superior numbers of these young soldiers, and in the end their Army fled in several directions, a thoroughly disorganised mass.

It was felt, after the war and its results, by every Nation in Europe that they could not go on on the old system, but that large armies, which could only be maintained by passing vast numbers through the ranks, were essential to National safety and existence. Lord Cardwell determined that we should follow the lead. He did not introduce compulsion, as every other Nation did, but he brought in a sort of hybrid service, neither short nor long. The result of it upon recruiting was as follows:—The figures are rather curious. In the ten years from 1861 to 1870, an average of 15,084 recruits were raised; of these an average of 1,894 came from the Militia; in 1881 to 1889 the average recruits were 31,537, of which the Militia furnished an average of 11,722, while the Reserve has gradually increased, and now consists of 80,000 men, of which 52,000 are Infantry, 6,000 Cavalry, 10,000 Artillery, 2,300 Engineers. Therefore the new system, compared with the old as far as statistics go, certainly has not produced a falling off. Now as to the Reserve; opinions differ you know to an enormous extent; some people say it is as fine a body of soldiers as any Nation could desire, ready at any moment to come to the front; other people tell you it is a very problematical body indeed, and that it is composed to a great extent of tramps, casuals, and perhaps worse. All we can judge of is by what we know, and not what we surmise. In 1878 the whole of the Reserve was called out; it then consisted of only 14,154 men—13,684 men responded to the call out of those 14,154. In 1882, 11,032 responded out of 11,642 called up for the Egyptian War, and out of 14,965 called up between 1st January, 1888, and 31st March, 1890, for instruction in the use of the New Rifle, only 339 failed to attend. Those figures shew that the Reserve, at any rate, is not a sham or a bogus factor. The one objection to it is the want of training, but that is certainly not the fault of the Military authorities, because they have pressed the necessity for training over and over again. The German Infantry soldier serves two years with the colours, and five years in the Reserve, during which latter period he may be called out for two periods not to exceed eight weeks, and in his first period of five years in the first Ban of the Landwehr he may be called out for two trainings of from eight to 14 days.

I will come to another item closely connected with recruiting, and also with the Reserve, and that is deferred pay. Opinions differ greatly as to its value; the Wantage Committee recommended its abolition, but there were two very prominent dissentients as to that: one was Sir Edward Bulwer, who had been Inspector-General of Recruiting, and the other was Sir Arthur Haliburton. Some people state that deferred pay is absolutely necessary to encourage recruiting, and that the men should go home with money in their pockets; other people say they very rarely reach their homes with any money in their pockets (applause), but that when they do go home they stand treat all round, and clergymen and magistrates will give you a very poor account of the reservist when he first arrives in his village. This may be true sometimes but I do not believe that it is so in the majority of cases. I must say I do wish there was some way of sending a man's deferred pay, to which in principle there can be no objection, and putting it into the Savings Bank or putting it out of his power for a little until the first flush of his discharge from the Army has passed away.

Then there are certain obstructions to men who wish to re-enter the service which are said to exercise a very prejudicial effect on recruiting, and on those I am not justified in pronouncing an opinion. The first is that a man must restore his deferred pay, which it is not very easy for him to do when he has once parted with his money. Another point is that a man must re-engage or rather extend his service within a year. That is said not to be a very wise thing for this reason: that a very good man may try his best to succeed in civil life and fail; he may save his money, but if he does not return to the colours within a year he is not accepted, even though able to pay back his deferred pay. I think some modification may be made as to this (applause). The Wantage Committee, with only one dissentient, recommended that there should be a considerable change in these conditions and that we should not weaken our first line quite so much for the sake of the reserve. Mind I am pronouncing no opinion, I am only giving you chapter and letter as things exist.

As to the linked battalion system it was intended that when both battalions were abroad a depôt should be immediately formed, as in Germany when a regiment proceeds abroad, and that 500 men should be added to the establishment for this depôt. I do not think this has been properly carried out; it is stated I know by the authorities, and it is believed by them, that recruits trained in a depôt are not equal to those trained in battalions; that is their opinion; and further it is said that in case of a war breaking out a depôt could not be made into a fighting unit while the home battalion training recruits can always quickly be rendered ready for service in the field. The question is one of extreme difficulty; we miss the fundamental principle of the German army, or of any other foreign army—compulsory service. We cannot do without a reserve and we cannot go back to long service in its entirety.

Many people, I consider, whose opinion is of very great weight, think that we might have two classes of service: that is, one class for home service entirely, three years with the colours and five with the reserve, and another class for both at home and abroad of 12 years, extending to 21 with a pension at the end of it. I cannot myself give any opinion as to the merits of this system; it would be proposed I believe to induce men in the first class with a three years' service to extend their service, and they would always be allowed to pass into the other class. It seems to be forgotten that we have a long service running with a short service, and that every man of good character can become a long service soldier (hear, hear). The qualifications of his good character are not very high; he must have one badge to extend his service from seven to 12 years, and two badges to extend his service from 12 to 21. Therefore long service does exist amongst us, and under present conditions it is not as popular as we should like it to be. There are now 950 warrant officers, 857 serjeants, and 14,479 other non-commissioned officers and a large number of men who are long-service soldiers earning pensions.

Another circumstance which has been mentioned to-night, and which no doubt exerts an immense influence on enlistment, is the employment of soldiers in civil life. There are a considerable number of soldiers so employed. In the Metropolitan Police there are 2,200 soldiers, of whom 500 are reservists; in the City Police there are 190. Both the Commissioners of Police have told me that soldiers make as a rule most excellent policemen. It is a very great mistake to suppose, as is very frequently done—I have heard it said over and over again—that the Germans employ all old soldiers in civil employment. The only men employed in government civil employment, are men who have finished 12 years' service. Certainly soldiers are employed in every branch, but every German is a soldier, and I am sure that has given rise to the mistake.

I should like particularly to allude to one thing, and that is the characters that are awarded to a large number of soldiers on their discharge (applause). It is a very serious matter indeed, and I assure you I very often consult large employers of labour, and one in particular who is most anxious to employ soldiers, and he says this—That the military character "good" is now reckoned amongst civilian employers of labour as "bad." I know, gentlemen, we are all tied down by regulations, which I hope soon to see altered, to give certain characters under what we will call academical conditions; but it has created among the large employers of labour a very bad impression that reliable characters are not given on the certificates of discharged soldiers.

I have very little more to say indeed, but I do hope that the discussion on the subject of the Army—for this discussion to-night has taken in the whole sphere of the Army—will be carried on calmly without acrimony and without personal attacks (applause). Not long ago a very bitter attack was made in a very leading journal against the Commander-in Chief, who needs no defence of mine but, personally, I have known him now for a very great many years, and there is no one who is a more sincere and ardent Army Reformer, who is more inspired by patriotism, or one who has the good of the soldier, and the good of the Army more at heart than he has (applause). A few days after this followed an attack on Lord Chelmsford for a statement he had made, and he was charged with misleading the public by making false statements. What he said was that the recommendation of the Airey Committee, that 20 per cent. of old soldiers should be in every battalion, had not been carried out. He was told that 63 per cent. of old soldiers were in every battalion. Well, this was rather an astounding statement, and when it came to be looked into, it appears that the writer calculated every soldier of three years' service as an old soldier. Well, gentlemen, I do not think this is the case; I know we generally look on old soldiers as soldiers who have passed their first, and have entered into their second term of service.

The one thought and anxiety of us all in this matter, is that our army should be worth the £18,000,000 which it costs the heavily weighted tax payer, and that it should be equal to the requirements of the Empire. We are not actuated by personal motives—why should personal attacks be made, which only weaken the case of those who make them. When an advocate has a losing case he is said to abuse his opponent's attorney.

With regard to the lecture we have heard to-night I am sure we are all most grateful to Mr. Arnold-Forster (applause). I have had the privilege of his acquaintance for several years now, and I do not believe there is a harder-working man in the City of London. If the day consisted of twenty-four working hours, it would not be enough for him to get through all he has to do, and therefore we should be more than ever grateful for his having come down here and devoted an evening to us, and we must never forget that it was he who originated and gave the impetus to the movement, which has resulted in our possessing the finest Navy the world ever saw (applause). A Navy, of which ten years ago none of us would have ever dared to dream (hear! hear! and applause).

CAPTAIN F. J. S. CLEEVE, R.A., who had been connected with recruiting at Woolwich for the last three years, pointed out that recruiters get the same "bringing money" for an immature youth as they would for a satisfactory man of 20. He also pointed out the disadvantage at which a man of 20 is placed as regards a man of 18 enlisting with him.

Lt.-Col. W. L. Davidson, R.H.A., thought that the payment of men according to their rating as specialists or excelling in any particular line would be a stimulus to recruiting; he concurred with Captain Cleeve's remarks on the disadvantage at which an elder of two recruits may be placed, and thought a birth certificate could nearly always be produced by a recruit. He thought depôt training the best for recruits and that it is a great mistake to stop recruiting as soon as the establishment is full, as the influx of recruits is thus checked, takes some time to recover, and many good men are lost. Col. Davidson advocated the teaching throughout the country of a soldier's work and duty to all youths, and that a certain number of men should be allowed to enlist for home service only who, as soon as they have passed certain tests, might go to their business with the liability to come up for service with the colours when called upon.

Major-General R. Dashwood, though not advocating a return to long service, quoted the Duke of Wellington's speech in the House of Lords where, with reference to the extraordinary feat performed by the 80th Regiment at Sobraon, he said: "This feat would have been impossible except by old soldiers," and "entreated their lordships, whatever they did, never to agree with any measures which might deprive her Majesty of the services of old and experienced men, and thus pave the way to disaster." He thought a good system of enlistment would be for six or seven years' colour service, and at the end of that time a right to re-engage with an increase of pay, deferred pay being abolished, or to go at once to the reserve for 12 years with the prospect of a deferred pension at, say, 45 years of age calculated on the amount of colour service put in; he maintained that by the present system a man's services are lost even in the reserve at the age of 30 or 32, when he should be at his prime. He pointed out that to ask private firms to employ reserve men is practically asking them to submit to extra taxation.

Lt.-Col. F. O. Barrington Foote, R.A., thought that an improvement of the moral tone and surroundings of a soldier's life would cause an increase in the recruiting of a better class; he also advocated the introduction of divisions or a cubicle for each man in the barrack room.

REPLY.

MR. ARNOLD-FORSTER—General Maurice, ladies and gentlemen. I have really nothing to add to what I have said. I am very gratified to find that what has been said has been a reinforcement and substantiation of my own views, and it has only made me more convinced that there is a sound foundation for the view I take, and that there is great room for improvement in the inducements which are at the present offered to the recruit. I hope to accept the invitation which I have had from Colonel Kilgour to-night to inspect the recruiting office at Woolwich, but I may point out, that why I dealt with the recruiting office at St. George's Barracks was that, at that office two thirds of the recruits, who tender themselves for the British Army, are received.

There is only one point I missed, which I should like to allude to. I see it is made a matter of reproach to officers with regard to their conduct towards recruits that they, or perhaps their injudicious advocates, have objected to the task of perpetually occupying themselves with the instruction of the recruits when they are sent to join their battalions. The charge is put in this way, and I am made the channel of laying it against the department. "Mr. Arnold-Forster paints a moving picture of the dissatisfaction of regimental officers at home on this subject", that is the instruction of recruits. "No doubt this part of their duty is not pleasant to them; they have to spend much time as military schoolmasters just as officers of the German and French armies are obliged to do. These fully recognise that the strength and efficiency of their armies depend upon the proper performance of that duty, and they conform to that plan." I have not heard British officers complain, but I do wish to point out that there is a vital difference between the circumstances in the two cases, that the German officers are preparing the recruits to serve under themselves, and the officers in our battalions are preparing recruits to serve under someone else (applause). I do not think that I need—if I do need, I must humbly accept it—the caution which was very wisely given to us, I think, by Colonel Turner, to conduct this controversy in a temperate spirit, and with an absence of personalities. I do not know that I am justified in thinking that the small part I have taken in the controversy so far has been marked by that quality (applause) but I have no greater desire than to conclude it as far as my part goes in the same spirit as that in which I began it. I am exceedingly obliged to you gentlemen (loud applause).

MAJOR-GENERAL F. J. MAURICE, C.B., Commanding Woolwich District, summed up as follows:—

CHAIRMAN: It is my duty now to sum up the discussion which has taken place. It appears to me that it has been very natural that Mr. Arnold-Forster's lecture should have been welcome to us here. He needed no apology on the ground of his being a civilian speaking to soldiers. That it should have been received as warmly as it has been, is a clear expression of your feeling, that the one thing we all want is to get the country outside the Army to take an interest in the Army (applause). I am, however, not quite sure whether the applause with which certain parts of the lecture have been received among us, is not a little deceptive as to the practical results to which it leads up. We all sympathise with what Mr. Arnold-Forster has said, for instance, about the exceeding importance of improving the character of the recruits if we can. But the whole question is one of experiment as to whether it is possible for us to take such testimonies, as to character, as will stop the enlistment of a number of men who now come to us—not at all bad fellows, but a large number of whom enlist under feigned names—and again a large number who enlist for one reason or another, that they do not want to give an account of. As Lord Charles Beresford put it the other day—We can't afford to lose the Scalawags. That we should immediately exclude the whole batch of those classes, present enormous difficulties to my mind. If we can, by any means, without losing them, insist on evidence as to character, there is no question about the advantage that it would be in all aspects.

There is another point which has been touched on by Colonel Foote, viz., the difficulty we all have of knowing what goes on in barrack rooms, and the fact that, at least in many cases, a class of men set the tone who positively make it intolerable for a decent man. For that the past history of the Army, and the fact that historically the Army was, at one time, recruited from the gaols and kindred sources, is largely responsible. Though we have long since abandoned such practices, it is very hard to get rid of the after effects in the impression on the country as to the natural source of recruitment, and the class of men who are willing to enlist.

Certain evidence has recently come before me, which I hope to take an early opportunity of laying before commanding officers, of cases in which very desirable young soldiers, who were made for the Army, have purchased their discharge for no other reason than this: that they could not stand what went on in the barrack rooms. That is, I think, a difficulty which we might somehow tackle before we can hope to greatly improve the character of our recruits. We must try if it is possible to prevent what absolutely is a fact now, that in many cases, not everywhere, the ascendency in the barrack room is in the hands of the worst men. In the middle of the 18th Century, the places from which they got the recruits for the army were the gaols—that is the naked fact—and if you will read Wellington's account of the men that he had in the Peninsula, his description, and the descriptions of the men who were round him at head quarters, of the kind of characters he had to deal with, you will see that a certain stamp was then fixed upon the barrack room, of which, in many cases, a trace remains not eliminated. That makes the path hard for a decent young fellow coming into it. It seems to me that that is one of the most serious difficulties we have to get over—if we can—if we are to make any improvement in the way of getting a better class into the army. We have greatly improved, but the tradition is not killed.

To take the next point, the whole scheme to which Mr. Arnold-Forster leads up, valuable as much as he says about it is, is, in fact, the institution of short service enlistment of three years for home, and the Depôt System for the supply of long service men in the Indian Army. There are depôts and depôts (hear, hear). I, myself, entirely agree with what Colonel Davidson and other officers have said about the value of the depôt for its own proper purpose: the training of recruits (hear, hear)—so much so that I, myself, am always hoping we shall manage to get all recruits who join six months in a depôt, but it is a question of money, because to change three months to six months' service in the depôt means doubling the depôt barracks throughout the country. That is purely a Treasury question. The great advantage is that, at the end of that six months you will have put them through the special training for recruits, and you will send them in batches, as the Germans do, to join their battalions, instead of sending them in mere driblets. It is the only way in which we can get over the difficulty of our taking recruits at every day of the year, instead of as would be the case with compulsory enlistment, taking them all at one time. It was for that purpose that the depôts were formed at General Bulwer's advise. He did more in his time for recruiting than almost anybody. He wanted to prevent the possibility of the recruit going as a mere object of bullying by himself into the battalion. He thought batches could be kept together and would be better able to look after themselves. It has been exceedingly effective within the limits assigned it, as far as I can see it in the Infantry, and I wish to goodness we had the same for the Artillery, when the smaller unit makes it even more necessary. The Infantry get their recruits now every three months. That is one valuable form of the depôt. It is the type of Caterham which Mr. Arnold-Forster justly praises. But the depôt system proposed for supplying India, is the forming of large depôts irrespective of territorial connection of any kind, in which, unless we get our recruits much older, men must be for two or three years. That is quite a different matter. The supply of battalions from depôts for long service in India, is one which we have tried, and one which has broken down in our hands. That the operation of training continually fresh men is a very unpleasant one for an officer who has to do it is undoubted. But if we adopted the three years' system we should have that work to do. Mr. Forster's proposal would not relieve us of it. To do away with it, as Lord Lansdowne said the other day, means five millions a year extra cost to the country, if we are to produce the Army we are able to produce by giving the mere sufficient training, and then sending them into a reserve.

We give men very much more training in the English Army than any Foreign Army does; we give seven or eight years, and in any Foreign Army only two are given. If we do for the reserve what must be done to make it effective under any system of three years' service, giving them proper training, after sending them into the reserve, why we should not be able to trust them when they come up so regularly—as they have done, I cannot see. The last time they were called up they joined to within 2 per cent., and for active service within 5 per cent. The fact that a certain number were not able to join within the time required for them, nearly accounts for the deficiency. They are never counted in the reserve after they have twice missed reporting themselves on a quarter day.

I do not think that the argument is a sound one, that officers would, on the three years' system, be training men whom they would see again, but that in training men for India, they are sending them were they will not see them again. The case seems to me to be exactly the reverse. It is an extremely problematical question whether an officer will, during his service, see again men who have been sent to the reserve brought in for war to his battalion. On the other hand, the interchange of officers between the home and Indian battalions is so frequent that officers constantly on arriving in India see the benefit in the well-filled ranks of the Indian battalion, of the training on which they have been engaged when with the home battalion. Actually the other day I was rather startled by the way in which the name "Gordons" was used by Colonel Mathias in addressing the old 75th in India. Officially correct as it was, they have only of course become Gordons by the amalgamation with the old Gordons, but the answer was made that most of the officers who were in the Dargai business were men who had been trained in the old Gordons. That shows the completeness of the interchange that had been going on between India and England. The connection between both battalions of a regiment has thus been established to such an extent that to break it up again would be a revolution, which would now entail great injury and great hardships. A battalion is certainly for men, after they have passed out of the stage of recruits, a better training school than any depôt which you can form. I am sure that any battery officer here would say that his own battery was a better training school than a depôt after men had once passed out of the recruit stage. Again, any system by which you form depôts for India, and have men on short service at home means, whatever gain you get by it, a complete separation between the Indian and the English Army, which, again and again, in every commission that has ever sat upon it has uniformly been condemned quite as much by the evidence of regimental officers as of anyone else. The whole weight of the evidence that went before the Wantage commission, taken from all branches of the army, was dead against it. Mr. Arnold-Forster theoretically agrees with the principle that this separation should not take place. His proposals seem to me inevitably to expect it.

Then, again, when Mr. Arnold-Forster talks about the proposed further breaking up of the regimental system by the formation of four battalion regiments, I think he misunderstands what the process in contemplation is. What the Secretary of State for War suggested the other day was, that two extra battalions should be raised, to be added to each of two regiments which had already two battalions. That does not mean a crush up of existing battalions. It has nothing to do with it. What actually is the case now, is that there are many regiments which are able to enlist within their own proper recruiting district very many more men than are necessary for the two battalion system. Those men, at present, are sent off to other battalions which have nothing to do with the regiment, and nothing to do with the locality. It surely will be a much more perfect carrying out of the territorial system, to have all the men who are coming from a district put into one regiment with four battalions, and to enlarge the work thrown on a particular county in accordance with what it is actually yielding in recruits. The complaint as to the territorial system, is that it has not been consistently carried out. I can testify, and anybody who knows any of the counties that have territorial regiments, can testify that the feeling arising locally between counties and regiments is very close indeed. I happened to be at Newbury when the Berkshire regiment was coming in, and the enthusiasm of the people because it was their own county regiment that was to pass through, could not have been exceeded. When a battalion has had sufficiently close connection with the county for county people to realise it, there is a local enthusiasm entirely due to our old historical county feeling. That seems to me, at all events, to be one of the very greatest value. I think that is an aspect of the question which does not forcibly come before an audience such as composes the majority of those here, because the Artillery has no connection at all with particular localities.

When Mr. Arnold-Forster speaks of the long service in the Navy and Marines, the whole conditions are so completely different that it is hardly possible to take an analogy from it. In the first place the Marines are able to accumulate money much better than our men are; so that practically they are in receipt of better wages. They have more money to spend. They are exposed to none of the conditions of constant interchange between home and abroad, that our battalions are exposed to. Their depôt is not one of the same kind that he wishes to form for Indian relief. It is a large brigade head-quarters in which the recruits are lost among the trained men.

We have the most complicated conditions to deal with. A huge proportion of our Army is abroad, such as no other nation has. We are more frequently engaged in War than any other nation. Yet we alone are obliged to face these difficulties without any power of drawing from the country such men as the state requires, by compulsory enlistment. Surely these are difficulties which must of themselves entail very careful handling. If any particular system is made responsible for what the very conditions of the problem involve, the only result must be that we enter into a series of disastrous experiments with perpetual change than which nothing can be worse for an army.

At the present moment what regimental officers all feel is that they have a condition of both batteries and battalions, which is most unsatisfactory. That is to say, that an over-strain has been put upon our present system. Instead of their being able to send abroad trained men, and to retain a sufficient number of trained men in their batteries and battalions, the men they have to send break up their organisation at home, and are not what they ought to be to be sent abroad, but that is not because the short service system has broken down, but because the system, as originally devised, has never been carried out.

It seems to me the confusion lies just here—that you attribute to the system what is entirely due to the conditions which, although provided for in the original scheme, have never been carried out. That is to say the scheme, as originally arranged, was not merely that there should be a battalion at home for each battalion abroad, but that the cadre of the battalion at home should be so strong that what was necessary to be sent out each year, should always be in excess of the cadre. If you had that so that your cadre at home was untouched and its efficiency unaffected, I do not think that the cry that has been raised for the doing away with the short service system would ever have been raised at all. It seems to me just as reasonable to throw the blame on the system as it would be to say that if an architect arranges for an arch to support the entry to a barrack square, and in the place of the arch you put in a rotten beam, and the super structure breaks down, that there the original architect's scheme was faulty. The two things have no relation to one another. What has been done is that whereas it was arranged that there should be one battalion at home, supporting another battalion abroad each political necessity for the increase of the army abroad, has been met by no such increase of the battalions at home as was arranged for in the original scheme (applause).

It seems to me that we are crying for the moon when we are asking for anything like doing away with such training of recruits as is being done by every Continental army. It simply means—for anything like the army we can get under our present system—such an enormous increase of expense, that there is not the smallest chance of any government taking it up or doing it. It is very much better for us to insist on the absolute necessity of our getting the cadres made so strong, and of our getting the numbers at home in proportion to the numbers abroad made so effective that we should not be put into the position of squeezed lemons that we have been. That is what we shall get ; the other we shall never get.

I think I have run over most of the points raised, but I wanted just to say as regards deferred pay, that there was one point of considerable importance, which Colonel Turner omitted on the Wantage commission. Eighty per cent. of the evidence of all ranks was in favour of it. That is a most important point, which ought not be ignored, when you have a fair representation of the army in all branches and in all parts, including the great body of the recruiting officers, who all gave evidence in favor of it. I think it would be dangerous to decide against it, because many of us, I, myself, among the number, often see bad results in particular instances. I do not know what Colonel Kilgour's views are, but wherever I have been able to get the opinion of recruiting officers they are in favor of it, because even when a man who has earned deferred money makes a too lavish use of it, the result of his going home with it in his pocket tends to favor recruiting.

It is so late that I will not keep you longer, gentlemen, and therefore, I may now, I am sure, with your full approval, return your hearty thanks to Mr. Arnold-Forster for his lecture (loud and continued applause).

SALMON FISHING IN EASTERN CANADA.

(*WITH MAP*).

BY

LIEUT.-COLONEL J. C. DALTON, R.A.

THERE are, I believe, different opinions as to the style of article which should find a place in the pages of the "Proceedings" R.A.I. Some, I fancy, think that we should confine ourselves to purely professional subjects and regimental gossip and that if such a topic as sport, outside our ordinary regimental meetings is to be chronicled, it should be confined to that branch of hunting of which we have all at one time been more or less ardent devotees, viz., the hunting of x!

On the other hand, there are a few, possibly, who would fain see our "Proceedings" more in the form of a social or sporting magazine and eliminate from it a great deal of the professional element, especially that of a more abstruse nature.

Personally, I incline to a "happy medium" and think that whilst the "Proceedings" are primarily for professional purposes, and for eliciting the views of officers on the burning questions of the day as regards military art and artillery science, still it is pleasant now and then, to leaven the lump with records of sport and travel in the various parts of the world to which the members of a regiment, whose motto is "ubique," are bound to penetrate at some time or other in their service.

It is, therefore, in this spirit that I offer these simple notes of a fishing excursion in Canada, and do not think I need apologise for so doing, otherwise than for my temerity in venturing to publish hints on a sport of which many of my brother officers probably know much more than I do, and on which they could, 'an they would', dilate with greater experience and to more advantage.

IT was my good fortune, this year, to get a rod on one of the best salmon rivers for fly fishing in Canada, the Bonaventure; and as many of my brother officers may visit that country either for duty or pleasure, or, what is better, for both in their proper seasons, it has occurred to me that a few notes as to the mode of living, outfit and system adopted, together with the class of sport to be obtained, may be useful.

Rivers of Canada.

The rivers of Canada, both in the east and west, teem with salmon, but there is a very great difference in the nature of the fish, and in the means to be adopted for catching them.

In this article, I propose only to consider the rivers which flow into the Gulf of St. Lawrence, but a few preliminary words on the western rivers may not come amiss.

Rivers emptying into the Western Coast.

The salmon in the Fraser river and in the rivers which drain into the Pacific, though in extraordinary numbers, will not rise to the fly. They can, I believe, be obtained by trolling with a spoon or minnow.

The Canadian Pacific Railway runs for miles alongside of the magnificent Fraser river, and it is a common sight to see the Indians seated on the rocks overhanging a small waterfall, scooping the salmon out in large landing nets as they are congregated for the purpose of ascending the fall and for pushing on after the manner of salmon as high up the river as they can get to their spawning ground. They go thus hundreds of miles up the river, their numbers being gradually thinned out as they proceed. but nevertheless leaving a sufficient number to breed a countless swarm of offspring to repeat the operation in succeeding years.

Salmon canning in West.

The salmon canning trade in the N.W. is one of the most important of the Canadian industries, there being 17 canneries on the Fraser river alone. In the year 1893 (which was not considered a good one), the revenue from some 315,000 cases of canned salmon amounted to nearly £500,000. There are three chief "runs" of salmon up these rivers in the season,

Runs of salmon on W. rivers.

(1). The "*Tyhee*" or spring salmon, which is the best and most like a Scotch salmon; they run between November and March and go to an immense size.

(2). The "*Sock-eye*," darker in flesh, but not running up to much over 14 lb. weight. They come up in July and August as a rule and in enormous numbers and constitute the main bulk of the canned salmon which one finds.

(3). The "*Cohoe*," which runs in autumn and is much the same in quality as the above. But what little experience I have had in partaking of these salmon on the spot, leads me to consider them far inferior to the fish one gets at home, or in the East of Canada.

It is quite a common thing at Victoria and Vancouver to see people out in boats just in the tidal water "harling" for salmon with a rod and spoon bait, or with a line held in the hand.

This sport is, however, very inferior to that which can be obtained on the East of Canada and of which I am now going to speak.

Salmon rivers in East Canada. (see map).

The salmon rivers in this part of the country are too numerous to mention; all nearly are good, though all are liable to have their bad seasons. It is a curious thing that one river may be bad in one particular season, whilst its next door neighbour seems as good as ever.

The principal salmon rivers are rented, often at very high figures and many of them by clubs of American gentlemen who, being endowed with large means, soon overbid the natives of the country when a river is put up to auction.

Restigouche river.

The *Restigouche,* which is perhaps the queen of all the Canadian salmon rivers, belongs to a club of American gentlemen, most of whom are millionaires. They have a charming club house at Metapedia and get very fine sport.

Those in Gaspé Peninsula.

There is a nest of good salmon rivers in the *Gaspé* Peninsula, which is on the southern side of the river St. Lawrence, in the Province of Quebec. These rivers flow from the watershed of the peninsula and in a southerly and easterly direction into the *Bay of Chaleurs.* The principal ones are the *Metapedia, Cascopedia, Bonaventure, Malbaie* and *Magdalene.* New Brunswick also possesses some good rivers, which flow eastwards, viz., the *Miramichi, Nepisiguit, Jacquet* and many others.

New Brunswick.

Nova Scotia and Newfoundland.

Good salmon fishing can also be got in Nova Scotia from Halifax and fair sport in Newfoundland, where the fish are small as a rule.

Route.

It is hardly necessary to describe the route from England, but we cannot do wrong in taking any steamer bound for Canada. The Dominion, Allan and Beaver lines will take you to Montreal and all the mail boats stop at Rimouski, which is a station on the south bank of the St. Lawrence, near the mouth. Here the mails are taken off and you enter a train on the Inter-Colonial Railway, which will convey you to Metapedia or Dalhousie Junction, if you are bound for the Gaspé Peninsula, or will put you down at almost any of the rivers in New Brunswick, which run into the Gulf of St. Lawrence or, if necessary, carry you on to St. Johns or Halifax.

Period for fishing.

Salmon fishing with fly ends on August 15th and in the leased rivers it generally begins about 15th June. The best time about appears to be 15th June to end of July. After that the salmon seem to get sulky, so many of them have been worked or pricked that they get shy and it is hard to get them to rise. Still with a party of four anglers it is almost unknown on the river I was on to have a blank day all round.

A fortnight's fishing early in the season will generally give an average of 30 fish per rod if not more.

Tackle, etc.

Rod.

For a fishing excursion, such as I am alluding to, the outfit is simple enough. A man should have two rods, one a greenheart 18-foot salmon fly rod with a spare tip or two, and a grilse rod. I killed fish on my 15-foot grilse rod up to 23 lb. in weight, but it was too great a strain on it and eventually it broke. Moreover, to work a lively fish in rapid water he wants a lot of the "butt," and an 18-foot rod comes in useful.

Gaff.

A good gaff with a long handle is essential, and if possible the gaff should not be screwed into the handle, as it is apt to unscrew when in the fish and to add greatly to the size of the hole made by the gaff. When a fish is gaffed from the canoe the handle often requires to be very long. Salmon landing nets do not appear to be used much, but I can't help thinking that a good strong net, if not too large, would save the fish a good deal, as often the fish may have to be kept some time (in the ice house or in the river) before sending away and the gaff hole is bound to be a weak spot. However, some of the canoes would find it rather awkward to take a large net, unless it was made on some collapsible principle.

Lines

As regards lines, you should have two good large winches to suit your rods, and interchangeable and a fairly heavy waterproof line (not sticky) to suit bright water on each. One hundred yards is sufficient, but it would be no harm to have another 30 yards of a much thinner line whipped on at the inside end[1].

Casts

The casting lines should be really good and of selected single gut, about three yards long. Twisted or double gut does not answer.

It is practically useless to take trolling tackle for the east of Canada, as the fish do not seem to care for the minnow.

Flies

Flies. Though there are certain flies which seem to do better in these rivers than any others, still it is as well to take any that you have. Flies on double hooks seem to be preferred, but I question whether a man who had only double hooks would do any better than one with only single hooks, other conditions being equal.

The best flies in question are (1) the 'Jock Scott'; (2) the 'Black Dose'; (3) the 'Black Fairy'; (4) the 'Silver Doctor'; (5) the 'Dusty Miller.' The 'Butcher,' 'Thunder and Lightning,' 'Claret Jay,' may all be tried as a change, but it is a bad look out if you cannot get a fish to rise to the first four I have mentioned.

The size, of course, depends on the water, but I believe in small flies and as a general rule a fly of about an inch and an eighth would be quite large enough. A tin cast box with some felt kept damp in it is useful. The sun is very hot and it is a bad plan to wind the cast on the butt as is sometimes done. They should be kept damp.

Sea Trout

Most of the rivers are full of sea trout, which run up to a good size. In my river I know of one taken, which weighed 5½ lb. I got one of 3½ lbs. They take in the more rapid parts of the river, and though very welcome when cooked, are sometimes not welcomed when larger game is one's aim.

Practically they will take any fly. I carried a trout landing net for the purpose of getting them into the canoe, as otherwise they have to be pulled in and often fall off. When taking freely they will pull a good salmon fly to pieces in a very short while. A very common size to take these trout is 2 lb. and for anyone who would give up a days' salmon fishing, a grand days' sport might be got with a light trout rod. But it is more than can be expected from frail human nature that anyone could give up his chance of a salmon, so long as there is a chance.

---

[1] Always run out the wet part of your line directly you get home, to dry it. It is the only way to preserve it. One of our party lost a fine fish on his first day, almost directly he got started, by having a rotten line, which he had borrowed and had not tested and had the mortification of seeing the fish (the first he had ever hooked) go off with a brand new casting line and fly worth, probably, six or seven shillings altogether and a quantity of his wheel line with it!

All the same it would be as well to take a trout rod and some trout tackle, because in the case of a heavy brown flood for example, the main river would be unfishable, and in some places the tributaries might afford good trouting.

Fishing basket and contents

A fishing pannier, with partitions for a flask, fly-book, spare winch, cast box, etc., is useful to take always in the canoe, and it is advisable that it have a waterproof cover. Don't forget a steel yard to weigh up to 40 lb. and weigh your fish directly he is landed. Other useful articles are a good clasp knife, also a picnic knife and fork in one, with a corkscrew, a small anglers' scissors, some good lashing in case of smashing your rod, some silk and shoemakers wax. The gaff handle, of bamboo, should contain two spare fly tips for the rod. It is often useful to have a felling axe in the canoe.

Mode of fishing

Fishing is nearly always carried on from the canoe and not from the bank. Often the banks are so steep and thickly wooded that it is impossible to land on them for purposes of fishing, or even for playing a fish.

Canoes

You have a canoe to yourself, manned by two Indians or others. You are 'poled' up the stream to the pool which you are going to fish, and when ascending the stream, you sit in the bottom of the canoe with your back to the centre thwart, thus having the weight forward. Your rod is alongside you, point to the rear and is placed on the side further from the bank up which you are creeping. As this journey up stream is often rather long and tedious, it is as well to be provided with some literature to pass the time away until the moment for action arrives. Fishing is always of necessity from canoes, as boats would be useless to get up rapid rivers. There are two kinds of canoes used, the birchbark and wooden canoes. The former are lighter and will go more easily over very shallow places, but are more crank and liable to damage if they strike sharp rocks when going at any pace. The Indians prefer the birchbark, but the local Canadian settlers usually have the wooden canoes, as for lumber work, which is the chief industry on these Canadian rivers, the canoe should be strong and able to resist rough usage.

Fishing a pool

On arrival at the head of the pool which you are to fish, the canoeman goes ashore and selects a suitable stone (which the French Canadians call a *roche*) to use as a killick. He then takes the canoe to the proper spot and gives the word to his mate "stop her." The stone is dropped and the canoe lies in the stream stationary. The angler then stands up in the canoe and fishes the pool in the usual manner. In many of the rivers the water is so clear that the Indian, or other man in charge of the canoe, can count the fish in the pool. These men have extraordinary eyesight and can see the fish even when the water is running fairly fast. If there is not much current anyone can see them. After half a dozen casts or so without rising a fish, the canoeman gives the word "drop her," the stone is raised and the canoe drifts a few feet and then the word "stop her" is again given and so on. The lengths of these "drops" is regulated according to the lie of the fish. If the fish are lying thick, the word is sometimes given "drop her, un petit bras,"[1] which warns the man at the stone to be ready to stop almost directly.

Playing a fish. So then the canoe moves down the pool, the angler having covered with his fly every fish in the pool. When a fish is hooked one generally waits to see what he will do before taking up the stone, as the object is not to disturb the water more than possible. As soon, however, as he begins to take long rushes, we up killick and get towards the other bank and if the bank will admit, one often lands and plays the fish from the bank. I found my fish extraordinarily game and very strong. The water being often very rapid makes the playing of a heavy fish exciting, and the occasional presence of snags and fallen trees abutting on the river, big rocks, etc., necessitates a sharp look out to try and out-manœuvre the fish who, as a rule, tries every possible means to outwit the sportsman and not unfrequently succeeds!

If you get into a rising fish who comes up to the fly, but does not hook himself, the odds are that if you persevere with him you will get him, but he needs humouring, and after rising it is as well to give him 5 minutes rest or so while you smoke a pipe before trying him again; first of all with the same fly, and if he declines that, then with a fresh pattern.

Canoemen My experience, which is not a very large one, leads me to the belief that the Indian or native canoeman, or fisherman is not so well up to his work as a fisherman gaffer and adviser, as is the usual Scotch gillie, neither do I think is he so keen. He is, of course, an expert canoeist and you may absolutely trust him to manage the canoe and to put you on the best water, but his knowledge of the science of angling is not great as a rule. He may suggest flies to put on, but would not help a beginner much I should say, still they are all very decent fellows and there is not much to complain of. They resemble the Scotch gillie in one particular, viz., in their zest and capacity for "whisky," though they do not often exceed. They get a daily allowance given them, but also look forward to drinking to the health of the salmon when he is grassed and to wish "bonne chance" to the successful angler. The work of poling up a swift stream for some miles is very arduous, but they seldom or never flinch from it and if they think you have a better chance of going a bit further up stream they will gladly go. They dislike as much as the angler to come back blank.

Cost. As one cannot have omelettes without breaking eggs, so one cannot expect to get good salmon fishing without paying for it, and it is generally expensive. The cost and tariffs no doubt vary according to the locality and river, but what I found to obtain at my fishing may, I daresay, be taken as an average sample. In addition to his share of the rent of the river (which, of course, varies considerably) each angler has to pay 2½ dollars or 10s. a day for his canoe and men's wages, and this is also paid on Sunday when there is no fishing. Then the party, consisting in my case of four men, have to divide between them the cost of another canoe at, say 10s. a day, which is engaged as a baggage canoe to move baggage, tents, etc., to the different camps; they also do other odd jobs. We got letters up from the nearest post town (six miles off) thrice a week, paying a messenger to bring them, and to take away ours, this expense was divided. Telegrams were always brought out at the cost of the receiver. Salmon were put in boxes and sent off twice a week when the steamer went, or an opportunity offered. The cost of boxes and cart hire were divided up. Then there were two cooks, one man for the lower camp and one for the upper. Their wages were divided as were all the expenses of food and drink for ourselves and the men. Someone of the party generally acts as caterer and general manager and on his management depends a good deal what will be the cost of living. With good management the total expenses (exclusive of journeys and rent of fishing) should come to 6 dollars or about £1 5s. a day.

---

[1] The language of these men is a quaint mixture of English and French. Between themselves the Indians speak in their native language, but they can all talk French and a little English.

This may appear somewhat high, but when it is remembered what extraordinary good sport is generally obtained (an average of 25 to 30 fish to each rod for the fortnight) that you are saving a large portion of your mess bill whilst away, and that you are laying up a stock of health which should last you for some time, the game appears to be well worth the candle.

Fishery Laws.

By the Canadian Government fishery laws, all net and rod fishing cease at 6 p.m. on Saturday until 6 a.m. on Monday, so that the fish have an opportunity to get up the river unmolested and the angler can take his rest on the seventh day according to commandment.

Outfit.

I have spoken of the fishing outfit; there remains, therefore, only the outfit of bedding, etc., and personal gear to mention.

Bed and Bedding.

In most of the fishing huts some sort of bed is provided. You may have the good fortune to find comfortable beds and wire mattrasses, but this is not possible, except when fairly near civilization, with roads for transport and where some caretaker can be obtained to look after what is left in the hut when the fishing season is over. Often you will find a rough log hut with wooden bed places partitioned off. On the planks which form your only mattrass, you generally place a good thick layer of spruce boughs. This forms a very comfortable bed, the odour of the spruce is most agreeable and wholesome and you can lay your blankets on it and sleep like a top. If you go into camp and sleep in a tent you have spruce boughs laid on the ground and sleep on them. Instead of a tent, you may only have what is known as a lean to, that is a half tent of triangular section open to leeward where a fire is lighted, and the travellers sleep on spruce boughs with their bodies fairly well protected and their feet to the fire. The smoke from the fire keeps off insects and other intruders.

In a tent it is quite easy to fix up mosquito nets, and you can sleep perfectly comfortably, It is, of course, unfortunate if the ground is very wet before you pitch camp, but if you have a waterproof sheet you can easily protect yourself from damp.

The first thing which is done on taking possession of the camping ground, is to cut down timber to make fires. A fire for the kitchen is at once lighted and water is put on to boil to prepare supper. Others are engaged in clearing the ground for the tents, cutting spruce boughs for the beds, setting up the tents, etc., and in a very short space of time there is a roaring camp fire going, your meal is prepared and consumed, pipes are produced and the toil of the day is soon forgotten. Songs, cards, etc., may serve to enliven the evening for a while, but one is generally ready for bed at a fairly early hour, as work is resumed betimes in the morning.

The backwoodsmen in Canada, or in Australia and other forest countries are wonderfully handy with the axe. In an extraordinary short time, with the aid of the axe alone, they prepare all that is necessary in the way of fire wood, tent poles, laths for various purposes, tables and washhand-stands.

Whatever the weather, they will light a fire in a moment, that invaluable commodity, birch-bark, serving as tinder, besides being put to a hundred and one other uses.

I have digressed considerably on the subject of bed and bedding and will now proceed with describing the rest of an outfit.

Blankets, &c.

In summer time a good plaid or railway rug and one blanket besides should suffice to take with you. Sheets are unnecessary and undesirable. A double blanket made into a bag is very useful, as it keeps out insects. Two pillow cases should be taken and a pillow (if not two). An air cushion is very useful, as it acts as a pillow by night and serves to reduce the stiffness which results from sitting all day in a canoe in a cramped position.

Waterproof sheet

A waterproof sheet is a necessity. It keeps your baggage dry in the luggage boat whether from rain or from the water which splashes in when ascending or descending rapids, and it protects you from damp at night.

Camp stool.

A camp stool to fold up into a small space is useful, as otherwise you must sit on logs of wood or other improvised seat. A brown holland hold-all to hang on the wall of your hut, in which you can keep your brushes, etc., and odds and ends, is useful and takes up no space.

Kit-bag (waterproof)

For carrying your clothes there is nothing much better than a couple of ordinary soldiers' waterproof kit-bags, which are closed by drawing together at the mouth with a cord. You can ram your clothes into them and chuck them anywhere without being afraid of damaging them. They are also insect proof so far as standing on the ground is concerned.

Ordinary bags of some stout material to pack your boots in instead of paper are very handy. The boots are generally greasy and dirty and by means of these bags they will not soil the other contents of your kit-bags.

Clothes.

It is important to avoid all needless baggage, because it means great trouble and expense if you carry much, and moreover constant packing and repacking only damages your clothes. If you expect to have to go into civilisation straight from camp, you can leave a portmanteau with town clothes at the base ready for you to pick up on your return.

For underlinen you require flannel shirts and trousers, with or without undervests and drawers, you should always, however, have these with you as often it gets cold enough to wear them. If you wear knickerbockers and long stockings you must wear leather leggings as well, because the mosquitoes will get through the strongest stockings. I found the most suitable dress was flannel or cloth trousers with my socks pulled over them. Anything made of wool can be got through by mosquitoes if close to your skin. They cannot, however, get through linen or calico and this is worth remembering. A loose flannel coat, which you probably take off in the boat whilst casting, and a belt, with a broad brimmed straw hat, bought often locally for a shilling or so, will complete your costume, not forgetting a good pair of greased shooting boots. If you are afraid of the flies you can buy some armlets to put on your wrists, kept in their place with elastics. And you can have a gauze all-round veil round your hat weighted to hang on the shoulders and kept away from your face by a whalebone hoop. But I think these are more trouble than they are worth. For rough weather you require a cap and for very wet stormy weather a sou-wester is most useful. A good old loose waterproof that you can wear when casting is a necessary item, for you have so much sitting in the boat that it is as well to keep dry if you can. Some men wear gauntlets to protect the wrists from flies. I will, however, deal with this subject under the heading of "mosquitoes and sandflies."

As regards the rest of your kit, all you require is a spare shooting suit or two and some spare underclothing, socks, etc., also a few towels. For putting on when you come in in the evening some soft white shirts with collars attached are useful and a pair of light boots or shoes.

A spare pair of shooting boots, a pair of strong slippers, and an old pair of tennis shoes are necessary and a pair of waterproof sea boots invaluable in bad weather, either for wear in the boat or about the camp.

I think grey flannel clothes are more suitable than white, they are not so conspicuous to the fish and they do not show the dirt.

Bring a mosquito net with you, with a linen top and large enough for a three-foot bed, with brass rings sewn in at the four top corners. This will serve either in the hut or camp.

Your usual dressing kit kept to reasonable limits, some soap, dubbin, mosquito preparations, eau-de-cologne, toothpowder and vaseline complete your requirements. One great coat or cape of some kind in addition to waterproof should be taken. It is useful on the bed and may be required for warmth even in the summer months. Do not take any large package as it does not go well in a canoe. In kit-bags as I have described, a hold-all, valise for bedding and a small dressing bag in addition to your rods and fishing gear should be ample. I had a tea basket, but never used it as the canoemen always have a kettle and frying pan in the boat and make tea whenever they land for lunch. A good wrist strap watch should be taken. Do not forget sketch book and camera if you are fond of these pursuits and a supply of literature and magazines will be much appreciated by yourself as well as by your friends.

Mosquitoes and sand flies.

All these Eastern Canadian rivers have a bad reputation for these winged pests. The early part of the season is, I think, worst, for they undoubtedly begin to decrease in number and virulence in August.

Some people seem to suffer much more from them than others. But they cannot be circumvented in any but a few stereotyped ways, and therefore, one must make up one's mind to endure them. Personally, I did not find anything so hard as I had been led to expect.

To guard against mosquitoes, you have mosquito nets for your bed, made of rather fine netting or gauze and furnished with rings at four top corners as I have described before. These rings can be attached to nails in the walls of the hut, or to upright posts on the bed, or to the side of your tent or poles in the tent, and you can always adapt them somehow so as to secure immunity in the night from mosquitoes. During the day you must either wear a head-guard as before alluded to, or anoint your face with some of the mixtures which are found the best for this purpose. Of these carbolized oil, oil of lavender, firwood oil, a mixture of vaseline and stockholm tar are all good. Also there are numerous preparations in the form of unguents and solutions for smearing your face and wrists with but, personally, I hardly found it necessary to use these except in the evening. On the river itself you are free from flies until the sun begins to get low. They catch you if you land among the trees to a play fish, and you have especially to beware of the sand flies and black flies; they are so small that they can get through anything almost! When you land for lunch, or when you sit out of doors for meals, or in the evening, the best plan to keep off the insects is to light so-called "smudges" of sticks and spruce boughs which are so arranged that they do not burn quickly but give a lot of smoke. You get to leeward of the smoke and, though it may be somewhat trying to the eyes, you will be free from insects. Similarly in your tent or hut; you drive out the insects by these smudges and then close up and put out the lights. One plan we adopted in the hut after dinner, when we wanted to sit and smoke or read &c., was to take the lamps and put them outside the windows of the hut which were fastened. The windows inside were then smeared with turpentine, a "smudge" was lighted in the room and this drove the insects on to the window where they stuck to the turpentine and perished. The rafters of the hut are generally full of flies, sleepy house and blue bottles. When the "smudge" is lighted you hear an angry buzzing begin up above as the smoke gets to them and then increases in violence till it becomes quite a roar of indignation. The flies descend into the room, and when the time comes the door is opened and a lamp held outside. There is a mob of half stifled flies in the open air, including a stray bat or two, and then the door is closed and you are able to re-enter a room fairly clear of insects but smoky.

There are practically no dangerous reptiles in these parts, and with due care one need not be unduly worried by the flies.

Personal reminiscences of sport, etc.

I feel that I have already devoted far too much space to the subject I have dealt with, so do not therefore propose to do more than give a a few of my own experiences during my recent trip to the Bonaventure.

We were a very jolly party of 4 (2 naval and 2 military officers), and we divided the entire fishery into two parts, the upper and lower, two going to the upper camp on Monday morning and returning on Wednesday; the other two taking their turn at the upper camp Thursday to Saturday afternoon. Then we always had a reunion at the lower camp, which were the head-quarters, every Wednesday evening and Saturday evening and the whole of Sunday.

The usual routine is to get up between 6 and 7; bathe in the river (which is icy cold and does not encourage one to linger longer than is absolutely necessary), then breakfast and start off each in his own canoe about 8.30.

Each half of the river was further subdivided into upper and lower pools which were fished alternately, lots being drawn to settle who had the lower water on the first day.

It often happened that owing to a fresh run of fish, to heavy rain or other causes, one pool became much better than another so that the only means of giving each a fair chance was by lot. At about 12 to 1 you generally land for lunch and give the men nearly an hour to cook and digest their frugal meal. As we started at 8.30 and did not get home often till after 7, we could well afford this brief rest during the day, and were thankful for it. Constant casting with a heavy rod, often with a strong wind, becomes a bit monotonous, unless the sport is fast and furious, which I am bound to say it frequently is.

After a long day of this kind, one greatly enjoys the unconventional dinner with one's mate at about eight o'clock, when we fight over again the battles of the day and generally write up the camp journal and fill in the record of the day's work. The camp journal is always more or less interesting and amusing, and does not leave the hut, so that a ready comparison of sport in different years can always be made.

The best days' sport I had, was on one day when I got 3 fish out of one very rapid pool (the river was high). The first I got was 20 lb. After a run he took up a position in mid-stream and nothing I could do would move him for long; he always came back to this place. The stream was very strong; I had an 18 foot rod bent to the utmost extent that I dared without breaking the triple gut cast, and there he kept me for an hour and a half. I was standing on the bank, I heaved rocks at him without success and at last, at the risk of disturbing the pool and contrary to the advice of my Indian, I got into the canoe and went in pursuit. He at once swerved and rushed for the rapid water, where I followed. The men managed the canoe splendidly and I was obliged to sit in the bottom and was kept spinning round and round like a teetotum, as he took rushes round the canoe in the rapids. At last he was cleverly gaffed as he floated dead beat past the canoe. I went back and was soon into another who repeated the tactics of the first, so I took him down stream and landed him in about an hour; he was 27 lb. Again I had a similar experience with a 34 lb. fish, the largest taken this season. As I did not hook the first till 12.30 and had to get lunch about 3, it was nearly dusk before I had finished with my 34 lb. fish, and drunk his health.

Another day I got 4, but this is nothing uncommon on this river; I got 18 altogether in 20 days' fishing, and they averaged 15 lb. each in weight. I had several blank days and the sport (though not to be sneezed at) was by no means up to the average of the party who preceded us, so far as numbers go.

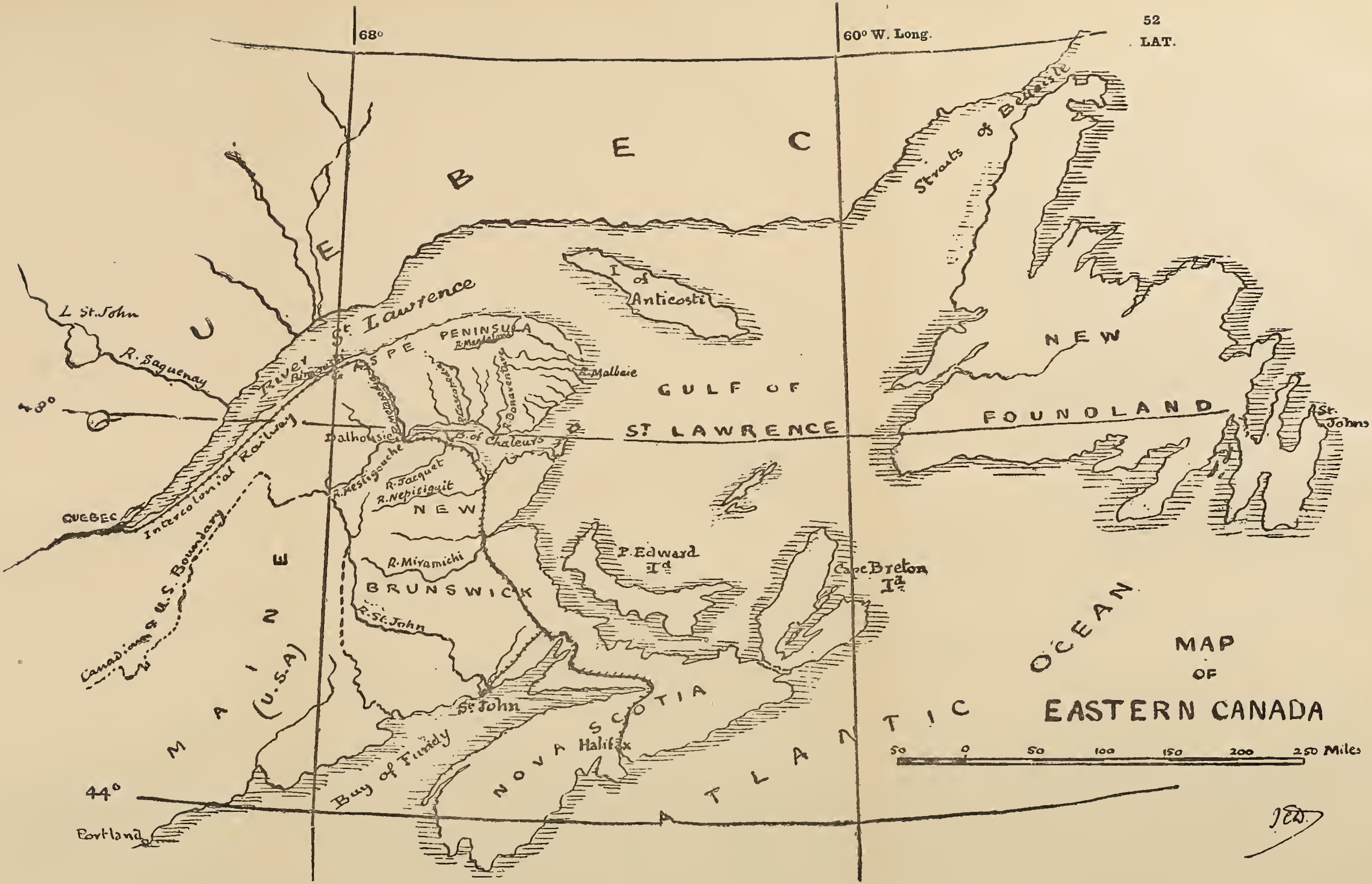
We had one very heavy spate and it was exciting work going up the river against the strong current; we had of course to hug the shore but constantly encountered fallen trees, which projected into the river and which are most difficult to get round. But though we had narrow squeaks, we had no accident.

One of our party saw three Moose, which came close to the water's edge.

I was watched fishing for some time one day by a good-sized black bear who was on the bank, just abreast of where I was fishing in mid-stream. He came down intending to cross and had all four feet on a small stone preparatory to launching into the deep, but on further thoughts decided to return the way he came.

We had depredations made on our fish by the wily Mink, a sort of water-weasel, which can scent fish a long way off. These animals begin their meal at the head of the fish and one of our party having left a fine salmon on the bank for a few minutes, returned to find a mink was so busily engaged in eating it, that his man was able to knock the mink on the head, but not before he had spoilt the fish to send away. It was very pretty to see the huge families of wood duck (I once counted 16), which, not yet able to fly, used to rush along the surface of the water with the anxious mother bringing up the rear. If they went across a pool, they would frighten the fish for a while and when we saw them we used to try and head them back.

A trip of this kind is so interesting that one could go on writing for ever on incidents connected with it, but I feel that I have already far over-taxed the patience of my readers (if there are any such!) and I will therefore conclude by saying that I cannot wish for any of my brother officers any more delightful excursion than such a one as I have described, and though I have only been speaking of one particular river, so far as my own experiences go, I quite believe that what I have written would apply to numbers of other Canadian rivers.



MAP OF EASTERN CANADA

MEMOIR.

GENERAL W. H. ASKWITH, COL.-COMMANDANT, R.A.

[Born 7th September, 1811. Died 25th November, 1897].

THE Regiment has every reason to lament the loss of General William Harrison Askwith, the oldest officer on the list of the Royal Artillery and the second senior Colonel-Commandant.

From the date of his earliest connection with the Regiment up to, we may say, the last day of his life, General Askwith took not only a lively interest but a most active part in regimental records and in everything which concerned and affected the efficiency and prosperity of the corps he so dearly loved.

It would be difficult to name any officer on the long and distinguished roll of the Royal Artillery, who so consistently identified himself with it. His memory was good and he loved to recall scenes and episodes which he was a witness of in the earlier years of his regimental life, especially when in the company of his contemporaries or of other regimental friends. General Askwith was a consistent collector of regimental records of all kinds. The writer can remember as far back as the sixties that the General, then the superintendent of the R. Gunpowder Factory, at Waltham Abbey, religiously kept up a huge list of all the officers R.A., in which he even noted amongst other things whether the officer were married or single! He had a collection of Army Lists from the date of his first commission and noted all the promotions, &c.: he kept up his Kane's List, worked out tables of relationship between the officers of the regiment, collected the war services, foreign stations and staff appointmentsof each officer, besides numerous other matters all of interest to those who prize records, and which must be of value hereafter. He preserved several old uniforms and regimental relics of various kinds, amongst others he still kept the mourning sash which each officer got who was on duty on the day of the funeral of William IV.

In his later years General Askwith devoted all his leisure to one great labour of love, the revision and amplification of "Kane's List." All the mass of records he had kept during his service now came in usefully and it must have been a matter of extreme gratification to him, to know that his labours were appreciated by the regiment and that the Committee of the R.A. Institution had decided to accept his manuscripts and to bring out a revised edition of Kane's List, which when it appears will be for ever associated with his name.

General Askwith went most carefully over Cleaveland's MSS. which are so valuable as giving records of the Royal Artillery in its earliest days and before it was formed into a regiment. He compared numerous authorities and was able to fill in several gaps in Cleaveland and *vice versâ* in Kane. He also (at no small expense) got copies of the records of service of all the officers, almost down to the present day, in order to supply the necessary additions to Kane's List which will make it a unique register when it is completed.

The subject of this memoir was born on 7th September, 1811, his family belonging to Ripon in Yorkshire. He entered the Royal Military Academy in February 1826, and got his commission as 2nd Lieutenant in 1829, 1st Lieutenant, 1830; 2nd Captain in 1841; Brevet-Major for service in the field in 1842; 1st Captain, 1846; Lieut.-Colonel, 1854; Brevet-Colonel, 1857; Colonel, 1858; Major-General, 1868; Lieut.-General, 1877, and General, 1879. He became a Colonel-Commandant in 1877.

After foreign service in Corfu, (whence he travelled in Albania and Greece), he went in January, 1838 to Spain as Military Attaché to the British Embassy, and for nearly 3 years was on constant active service as British Commissioner with the Spanish Army of the centre in Aragon and Valencia, during the long struggle to suppress the Carlist rebellion. During this period he was present at a great number of actions and was constantly under fire—at the action of Muniesa his horse was wounded —and he took part in the operations about, and siege and attack of Morella, the action of Miella, retreat to Caspie, actions near Segura and Utrillos, also at the action of La Scenia where he was wounded. General Askwith once informed the writer with reference to the wound he received, that on an aide-de-camp of the general (on whose staff he was at the time) being sent with some order, he volunteered to accompany him; the aide-de-camp was killed and Askwith was struck, but the bullet fortunately, was partly spent; as the weather was cold, he was wearing a Horse Artillery Pelisse at the time over another jacket and when he felt himself hit, he put his hand inside his jacket to feel the place where the bullet had struck and the bullet came out into his hand. During the period that he served in Spain, he made the acquaintance of all the leading Spanish generals and statesmen of the day, with some of whom he was on the most friendly terms.

As a senior Subaltern, he was appointed to the R.H.A.; but, owing to his employment in Spain lasting almost up to the date of his promotion to 2nd Captain, he never (so far as the writer knows), had an opportunity of joining his troop.

In recognition of his valuable services whilst attached to the headquarters of the Spanish army, Queen Christina conferred upon him the Insignia of a Knight Commander of the Order of Isabella the Catholic, Cross of the Order of Charles the III, and two Crosses of the

First Class of the Order of San Fernando, each of these last decorations being accompanied by a Cross of Drawn Swords for "service in the field", to be worn below the order.

General Askwith was an accomplished draughtsman and made a collection of sepia sketches of many of the scenes of the Civil War in Spain. His sketch books were exhibited at an exhibition of original drawings by officers R.A. and R.E. held in Maclean's gallery, Haymarket, some 25 or so years ago. Several of these sketches were used to illustrate Major Duncan's (R.A.) book *The English in Spain,* towards the compilation of which General Askwith was able to afford much useful and authentic information. He and Duncan were great friends, both having a fondness for regimental history, General Askwith took much interest in the *History of the Royal Artillery* and frequently corresponded with Duncan on regimental matters.

On his return from Spain he performed regimental duties at home, at Malta and Jamaica and soon after the Crimean War commenced he, having just been promoted Lieut.-Colonel, was selected as acting inspector at the Royal Gunpowder Factory, Waltham Abbey and in the following year became Superintendent. The work at that time was naturally very heavy and the new Superintendent brought all his energies to bear on it and never spared himself. He held this important post for no less than 14 years, during which time he was instrumental in doing much towards the improvement of machinery and the development of gunpowder and explosives. He also served on the First Committee on Torpedoes.

Having reached the rank of Major-General before his appointment at Waltham Abbey expired, his active employment in the army ceased, but he did not retire until the age clause in the Royal Warrant placed him on the retired list on 1st July, 1881, after 52 years full pay service. For a short while prior to this date he received the Distinguished Service Reward.

On leaving Waltham Abbey, General Askwith purchased No. 119, St. George's Square, S.W. where he lived until his death.

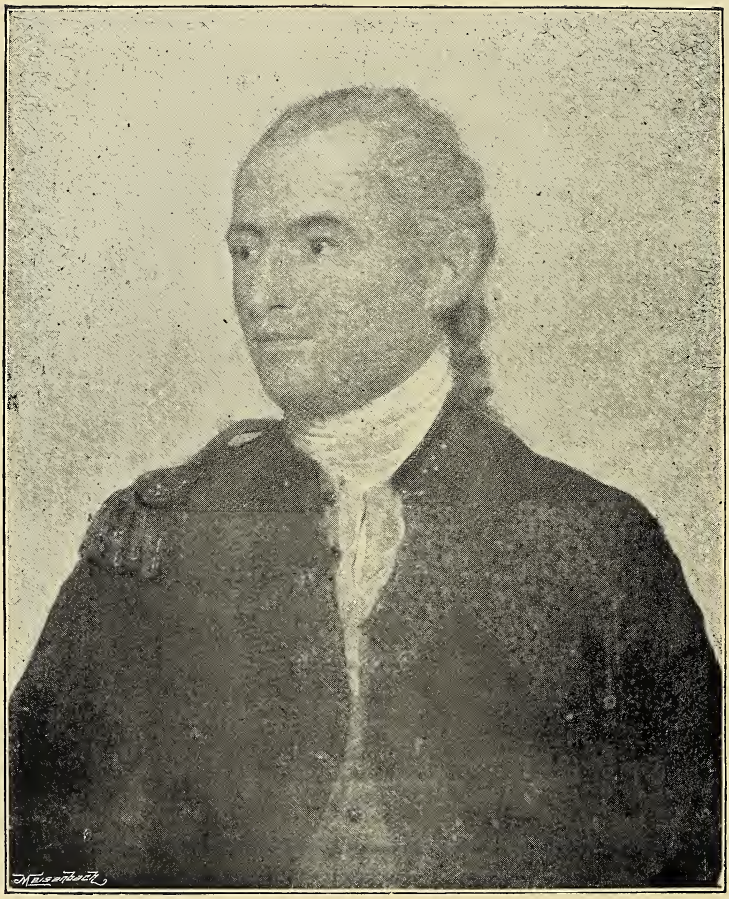
The deceased officer was a man of particularly genial temperament, hospitable and charitable to a degree ; and of a most lovable disposition. Endowed with the highest principles and tried common sense, his advice and opinion were held in great estimation by those who had the advantage of his acquaintance. Except on a few and happily rare occasions, he enjoyed good health up to the last, and probably no other officer (young or old) in the regiment, has been such a regular supporter of the Annual Regimental Dinner. His health prevented him from attending the dinner in 1897, and H.R.H. the Colonel of the Regiment, alluded to him in his speech in feeling and graceful terms. On some of the last occasions when he was present at the dinner, he had to respond to the toast of "The Retired Officers", and always managed in the briefest of speeches to say just the right thing.

He was a man of slight build and below the average height, but very erect, soldierlike and wiry, and just the figure to be able to undergo more than the ordinary share of hard work and fatigue. He was always fond of walking exercise, and to his active and abstemious habits are no doubt greatly due the good health and unimpaired faculties which he maintained to the last. He married soon after going to Waltham Abbey, Elizabeth, only daughter of George Ranken, Esq. who survives him, and by her had a family of five sons and two daughters. Though especially happy in his family relations he had the great sorrow of losing 3 of his children, viz. : the eldest son, Lieut. W. B. Askwith, R. E., who was killed at Suakim in 1885; his fourth son, Lieut. Charles Hamilton Askwith, R.N., who died of fever on return from Malta in 1887, and his eldest daughter, Mrs. Kennedy, who died some years since. His children who survive him are G. R. Askwith Esq., Barrister-at-Law, Captain J. B. H. Askwith, R.H.A., Captain H. F. Askwith, R.A., and one daughter unmarried. The deceased general was a cousin of the late General Sir William Bell, K.C.B.,Colonel-Commandant, R.H.A. (Adjutant R.A. at Waterloo), who was also a native of Ripon, and he inherited the latter's medals and decorations.

General Askwith was laid to rest in Kensal Green Cemetery, on November 30th, 1897, with every token of respect. Major Abdy, R.A. attended and placed two lovely wreaths on the coffin, one from the R.A. Mess, Woolwich and another from the R.A. Institution; a large wreath being also sent from Aldershot.

It is no mere eulogistic formula to say that few men have led better, more useful, or more honoured lives than the subject of this memoir. In point of age he was Father of the Royal Artillery, and we his sons cannot do better than try to emulate his example.

Some of the above information has been taken from the obituary notice in the *Times*, November 26th, 1897.



COLONEL JAMES, ROYAL ARTILLERY.

THE SERVICES

OF

LIEUT.-COLONEL FRANCIS DOWNMAN, R.A.,

IN

FRANCE, NORTH AMERICA AND THE WEST INDIES BETWEEN THE YEARS 1758 AND 1784.

EDITED BY

COLONEL F. A. WHINYATES, *late* R.H.A.

MAR 21 1898
U. S. PATENT OFFICE

CHAPTER II. *Continued.*

Lieutenant Downman's occupation and amusements. A canoe voyage. The peace of 1763. Return home. Voyage to America. A violent storm. Letters on the outbreak of the American War of Independence.

On the *12th August, 1764,* a large detachment of Artillery under the command of Major James,[1] embarked and went down to Gravesend.

---

[1] Kane's List No.73. Major James and Lieutenant Downman were connected by marriage; Mrs Downman being a daughter of Mr. Francis Day of Pontefract, Yorkshire, whose sister married Major James. Major James served many years in North America, he was a man of taste and good private fortune and owned a beautiful house and garden with a valuable library in New York, which was burnt by the mob during the stamp act riots whilst the owner was on leave in England.

Among the Downman papers is a little note-book which belonged to James, in which he accurately describes the features of the country and scenery in a passage down the Hudson from Albany to New York. We will quote his entry for Tuesday June 30th, 1767.

"Northward of Butter-milk fall, twenty yards from the shore, in 39 feet water, muddy bottom, landed, ascended up an uneven rocky path, but continued through a maze and winding way under the sylvan umbrage, but sultry hot; the top a little cultivated by an old Cornishman, whose sons have two other farms on each side and within half-a-mile of him. On the opposite shore lives Beverley Robinson.[2] The Cornubrian was at the taking of Gibraltar, in the year 1704, then 23 years old. This old man has 1000 acres for which he and children pay a quit rent of half-a-crown a hundred. They raise grain for themselves, though not sufficient; with sheep, pork, cows, etc. They are wood cutters. The boats fetch it for market at New York, and pay nine shillings dear, and six or seven, cheap, a cord, market price sixteen cheap, thirty dear, oak. Think of a man, a helper in the taking of Gibraltar! one of the jewels in His Majesty's Crown! to be imbosomed in these high lands, where from the top, a ship, a skiff, a buoy, is almost too small for sight."

That James had a fellow feeling towards any one connected with Gibraltar, we can well understand for in 1771, he wrote his most learned and exhaustive book, in two volumes, "*The History of the Herculean Straits, now called Straits of Gibraltar,*" a work of much excellence. He also mentions on his way down the Hudson, passing Ducking Island, reckoned midway between Albany and New York and so called because unless passengers pay a bottle of wine they are ducked as in passing the tropics. Major-General James died a Colonel Commandant in 1782.

[2] Beverley Robinson's house still stands, from whence General Benedict Arnold conducted his correspondence with Sir Henry Clinton, and where he met Major André, on September 22nd, 1780, to arrange the final terms of his treacherous proposal.

On the *16th*, we left this place and anchored at the Nore.

August 17th.—Weighed, and the same evening came to in the Downs.

August 18th.—Exceedingly bad weather.

August 19th.—In the morning weighed anchor and set sail with a good wind.

August 23rd.—In the evening, came to anchor in the Plymouth Sound. Went on shore, eat and drank very heartily by way of taking leave, and returned on board after purchasing a few things necessary for the voyage.

August 24th.—In the afternoon we weighed anchor, a delightful breeze filled every sail and soon wafted us out of sight of land which I left with much regret.

Our passage to the 20th September glided smoothly on. We had met with a sloop from Guadeloupe to Bristol and two large sloops near the banks of Newfoundland. We had encountered no wind or sea that made it the least disagreeable, but the time was very near at hand that would show us how uncertain everything is in this world, and how little to be depended on are the fairest appearances. We lay to on the banks, but very unluckily could not catch any fish. The greatest part of the day was fair and pleasant, but towards the evening there appeared a vast change, angry dark clouds arose on every side of us, the wind began to howl and freshened every minute, the portentous birds were flying round the ship, and seemed to warn us of the approaching danger. The master had paid attention to all those signs and had put the ship under a reefed fore-sail and a close reefed topsail. The wind at length began to blow a gale and increased till about 12 o'clock at night, when it blew with such astonishing violence that the fore-topsail was torn to atoms in an instant, and the fore-mast in the greatest danger of going over-board. By this time the sea had rose to such a height that the waves which rolled after the ship were as high as the mizen top, and from the darkness of the night appeared rather as mountains of fire, threatening every minute to burst in a deluge upon us and at once engulph the vessel and crew beneath its torrents. "The stormy genius of the deep seemed to have forsaken his cavern, to bid the tempest spread its blackest pinions turbid and terrible with hail and rain, pour its loudening blasts in whirlwind forth, and from the lowest depth upturn the world of waters." The ship is in the greatest danger; several seas break over the quarter, she is first down on one side, then the other, she is wheeled in dizzy whirl her helm with difficulty guided; at length she is thrown on one side and in this tortured condition remains a minute or two, no soul on board expected she would rise again, but the supreme hand of Him who is the disposer of all events raised her up, and with her our drooping spirits. The storm continued all night, and the next day several seas broke into us; one in particular, determined on mischief, broke upon the quarter, and drove upon the port. A deluge of water came in and set every thing swimming that was in the cabin, from hence it found its way into the steerage and almost overwhelmed the officers' wives and a number of children. The shrieks of the one and the crying of the other, and the condition everyone was in with the danger of the ship, made our situation excessively distressing. At length after three days of this dreadful kind of weather, that Providence which had hitherto protected us, ordained that the wind and sea should have some respite, which gave us an opportunity of congratulating each other on the recovery from such imminent danger. In this gale of wind the lading of the ship shifted, which gave her a considerable heel to one side, and as cannon was our cargo, it was impossible to remedy this matter at sea; we were therefore obliged to pursue our passage in this perilous situation. On the 4th of October, in the morning, we discovered land, but on our nearer approach found to our no small mortification that we were 30 leagues to leeward of our port, and therefore stood out to sea, and on the 7th October, we made the Navesink; here a pilot came on board of us and we brought to within side Sandy Hook, and remained all night. The next day, the 8th, we anchored at New York.

During Lieutenant Downman's first tour of service in America, between 1764 and 1772, the agitation resulting from the measures adopted in 1763, by the English Parliament to increase the revenue hitherto collected from the North American colonies was in full force. His being in Florida, far away from the principal scene of discontent and disaffection in Boston and Massachusetts Bay, may be the reason he has left no record of the events. After his return to England he appears to have kept up a correspondence with his relative, Colonel James and other friends, and he has preserved some interesting letters written at the out-break of the War of Independence in 1775. As we now come to his own experiences in the campaign of 1777, these letters are inserted here.

LETTER I.

It does not appear by whom this letter was written, but it was penned the day after the action on Bunker's Hill.

Boston, 18th June, 1775.

We left Cork early in April, and after a very tedious and disagreeable passage of seven weeks, arrived here on the 26th of last month. On our landing we found everything in the utmost confusion, partly arising from the murmurs of the soldiery, the difference of opinion among the superior officers, the want of fresh provisions, the great unhealthiness of the troops, and above all, the misery of the wretched inhabitants, destitute of food, raiment, or property.

Yesterday morning the troops were ordered under arms at 3 o'clock, on a boat being sent from one of the ships of war to acquaint us that the rebels were raising works in order to besiege us and put us between a cross fire.

The troops destined for service were landed on the Charlestown side between 8 and 9 o'clock, but on account of the number of rebels, the troops did not begin the attack for a considerable time. In the prodigious confusion this place is now in, all I can tell you is that the troops behaved with the most unexampled bravery, and that after an engagement of nearly five hours, we forced the rebels from their posts, redoubts and entrenchments one by one. The victory has cost us very dear, as we have lost some of the best officers in the service, and a great number of private men, nor do I see we enjoy one solid benefit in return, or are likely to reap from it any one advantage whatever. We have indeed learnt one melancholy truth, which is, that the Americans, if they are equally well commanded, are full as good soldiers as ours, and, as it is, are very little inferior to us even in discipline and steadiness of countenance.

Yours etc.

LETTER II.

From Lieut.-Colonel Thomas James, R.A.

June 23rd, 1775.

Dear Downman,—

We are in thickness of war, we have had two battles[1] already, in the last we carried our point, took the lines and a strong redoubt, with 2,500 men against 7,000. We have upwards of 80 officers killed and wounded, and the flower of the grenadiers and light infantry; some regiments have but five grenadiers left. We had at one gun the officer and volunteer wounded, and but one man without a wound. Lemoine[2] is wounded, so are Huddlestone[3] and Shuttleworth.[4] We are well. My volunteer hands have been full. To-morrow I go on another attack, covering the left in my gondolas, which I have made, viz., three with a heavy 12-pr. in each prow. Adieu.

Thomas James.

---

[1] Affairs at Lexington, 18th April, and Bunker's Hill, 17th June, 1775.

[2] Kane's List, No. 289.

[3] Kane's List, No. 277.

[4] Kane's List, No. 481.

LETTER III.

FROM LIEUTENANT JOHN LENTHALL, 23RD FUSILIERS.

TO

LIEUT.-COLONEL JAMES, R.A.

Boston, August 15th, 1775.

The news in Boston much the same as when you left it. I will collect all I can. Imprimis. We took a captain of a company belonging to General Lee's Virginia Riflemen, who attacked the advanced-guard near to your friends' house in the front of our encampment. They got between the guard and lines owing to the darkness of the night, but ill-timed it, for they attacked us just as the relief came down, which made our party formidable. The rascals called out to us several times to surrender, but to no purpose, for Phil Garlick was in the thick of it, instead of which I gave them a platoon, the other officer did the same, which made them believe we had got intelligence of their design, and had got a strong reinforcement. It obliged them to fight their way back, and we ours up to the lines. They never intended to have fired a shot had not we begun, but their intention was to have taken us all prisoners. They had 300, we 60 men. A narrow escape I assure you. We burnt Penny Ferry House in revenge, and should have taken the whole guard and burnt the barns up Mystick road, had our men behaved like men and soldiers and obeyed orders, which were upon no account to fire even if fired upon, instead of which, without being fired upon, they fired and to mend the matter ran away without even having their fire returned, wounded Captain Sabine of the Marines, who is since dead, and had it not been for myself, who am sure to be in all the fun, they had left him to the mercy of the rebels, but I called to them, and swore I would fire upon them if they did not return, by which means I got sufficient men to carry him home. Another officer of the same corps went with a party to the lighthouse, was killed and all his party killed or taken prisoners.

Williams[1] of the artillery, has burnt the King's Arms, Roxbury.

Boston is in an uproar, occasioned by a dispute between Admiral Greaves, and Hollowell, the Commissioner of the Customs, about some hay which the latter wanted permission to bring over from one of his own islands, which the other refused to give leave for, unless Mr. Hollowell would give the Admiral half. Admirable! Mr. H. refused. Mr. H. wrote a card, the Admiral sent a verbal answer. They met in the street about 12 at noon, high words ensued, the Admiral gave Mr. H. a box on the ear, Mr. H. returned the blow and knocked his Admiralship down, he got up and was going, nay, had drawn his sword, upon which Mr. H. closed with him, took his sword and broke it in several pieces, and told the Admiral it was not the first time he had drawn his sword like a scoundrel on a naked man.

---

[1] Kane's List, No. 268. Captain Lieutenant Edward Williams.

Since you left us the rebels have hoisted a flag on the high hill, on one side is an appeal to heaven, on the other *Qui transtulit, sustinet.* The devil a one of them come within shot of us lately. We have tumbled down three or four; not one of them appears, but we fire at him as you would at a blackbird on a hedge. The day they hoisted the flag they fired a cannon, and put out a pompous, and like all other things, a lying advertisement, they say when the Israelites fired, the Philistines put themselves in battle array.

We have thrown up a couple of *flèches,* one on the right and another on the left of the road side that we came along on the 19th of April[1] in front of the works. We neither know whether we winter on the hill, or where, or what will become of us.

Colonel Cleaveland[2] has put Mr. Martin under an arrest. Martin told him he would bring him on his knees before the House of Commons for his late behaviour. Cleaveland has offered him his freedom, but he won't accept of it.

Yours etc.

PART II.

Campaigns in the American War of Independence, 1777–8.

The War of Independence had been two years in progress when Captain Downman arrived in New York, in June 1777. But though the army had been uniformly successful in its encounters with the American troops, yet, as all the efforts of the English Government to conciliate the rebellious colonies had been fruitless, no real advance had been made towards a settlement of the existing differences. Before giving Downman's personal experiences, it will not be amiss to give a brief outline of events previous to the commencement of his narrative.

The battle of Bunker's Hill, June 1775, was followed by a close blockade of Boston, and at the same time an attempt was made by a rebel force to seize Quebec and win Canada to the side of the colonies, but the inhabitants were thoroughly loyal and the enterprise entirely failed.

In March, 1776, General Howe, who had succeeded General Gage in command of the army, evacuated Boston and retired to Halifax, Nova Scotia, until the arrival of a fleet under Lord Howe, together with reinforcements, enabled him in July to proceed to New York, which Washington had meanwhile occupied with his army. In the operations which followed, the Americans were defeated at the battles of Brooklyn and White Plains, driven from New York and obliged to retire across the Delaware river, while the English forces overran the Jerseys. At the conclusion of this years' campaign, the fortunes of the rebels were at the lowest ebb, and had General Howe utilised to the fullest extent the victories he had won, it is not improbable the war might have been brought to a conclusion.

---

[1] On the retreat from the affair at Lexington.

[2] Kane's List, No. 83. Commanding the Royal Artillery in North America.

For the campaign of 1777, a plan was adopted for General Burgoyne to move with a force from Canada by the lakes and unite with one under General Howe from New York. The results contemplated were : to overcome all resistance in the region between the lakes and Albany, to gain undisturbed possession of the river Hudson, thus severing the Eastern from the Western States north of New York, and to conquer Pennsylvania, whose capital Philadelphia was the metropolis of the American states. With these objects in view, about the same time in June that Burgoyne moved from St. John's towards Crown Point and Ticonderoga, General Howe left New York and crossed over to the Jerseys with the intention of bringing General Washington to a general engagement, could he draw him from his strongly intrenched position at Morris Town. Failing to accomplish this, Howe, at the end of the month, returned to New York, and in a few days embarked his troops on board the transports, when, after a long delay, he sailed for the mouth of the river Delaware, but finding the navigation obstructed he steered for Chesapeake Bay. It is during this voyage that Captain Downman begins to record his experiences as follows :—

DIARY.

From August 11th, 1777, to October 25th, 1778.

CHAPTER I.

The expedition to Chesapeake Bay. The army lands at the head of Elk River. Marches towards Philadelphia. Battle of Brandywine. Entrance into Philadelphia. Captain Downman takes the frigate Delaware.

On board the *Brilliant*, at sea, August 11th, 1777, being the 19th day since we sailed from Sandy Hook, bound we cannot tell where, but as is generally believed to Virginia. We have had nothing but contrary winds since our sailing. Our fleet consists of 12 or 13 men-of-war and frigates and nearly 300 of other vessels, and about 18,000 troops commanded by Lord and General Howe.

August 12th.—This afternoon about 5 o'clock we saw land, but not that part which we want, we being many miles northward of the Capes of Virginia, and the wind is still contrary. In the evening about 7 the Admiral made the signal to tack and stand out. The weather is now insufferably hot.

August 14th.—About noon the wind came favourable, and we are now standing towards Chesapeake Bay. In the afternoon we saw the land, and in the evening after dark the Admiral made the signal for the fleet to come to anchor, which they did in eight fathoms of water. We were told by some gentleman who came on board to-day that we were first intended for Philadelphia, but the Admiral learnt while we lay off there that the rebels had a great number of fire stages and other impediments in the river, which induced him to alter his first plan. They said also that General Washington had arrived at the Delaware with his whole force, two days before us.

August 15th.—This morning early the fleet got under way, and are standing into the bay of Chesapeake. Our ship has just received orders from the Admiral to lead in the transports. He sent a pilot on board, and desired we would hoist a white jack at the mizen peak and fire a gun for the ships to follow us. We sailed a few miles up the bay, and came to anchor in the evening, as did all the fleet. The rebels made fires on the shore to give notice of our approach. We heard to-day that four rebel ships ran out of the bay last night, and that two of them were taken by one of our men-of-war.

August 16th.—This morning the whole fleet set sail, and went up the bay with a fair wind. In the evening we came to anchor near Point Comfort. The fleet had just come to, when a very violent storm of thunder and lightning, wind and rain came on. Our destination is said to be Annapolis, in Maryland. About midnight the storm came on again with greater violence and continued the most of the night, the thunder and lightning incessant.

August 17th.—This morning the Admiral made the signal for weighing anchor; about 7 o'clock the whole fleet were under way and are standing up the bay with a fair wind. There does not appear to have been any damage done last night. To-day is excessively hot, and about noon it became calm, and the fleet came to anchor.

August 18th.—This morning about 5 o'clock the fleet got under way and stood up the bay with a fair wind, and about 11 we were opposite Smith's Point. We can see several small vessels belonging to the rebels in shore, also a row galley that keeps to windward; she came as near as she dare venture and fired a shot at the fleet, but it fell short. About noon the whole fleet came to anchor near Smith's Point, the wind being contrary. A packet arrived in the fleet yesterday from England; she called at New York.

August 19th.—This morning about 8 o'clock the Admiral made signal to weigh. Wind and tide in our favour, we continued our progress up the bay till the evening about 7 o'clock, when the signal was made for anchoring, and we came to in eight fathoms water near the cliffs of Petuxen, about 32 leagues from Annapolis. A gentleman came on board of us to-day and told us that the *Fox* frigate had been taken by the *Hancock* and *Congress,* two rebel frigates, after an obstinate engagement; that a little time after the three ships were chased by an English frigate, the *Flora,* which was soon after joined by another English frigate, the *Rainbow,* and that they re-took the *Fox* and took the *Hancock,* the other making her escape. The *Flora* had the resolution to give chase to the other three ships, for the rebels had manned the *Fox.* During the chase the four ships were discovered by the *Rainbow;* she at first imagined them to be rebels, but on the *Flora* ranging up alongside the *Fox,* and giving a broadside and hoisting English colours, the *Rainbow* saw what they were and soon came up with them, when the *Hancock* of 36 guns, commanded by one of their best seamen, Admiral Manly, struck to her with little resistance. The rebel frigate that made her escape was the *Boston.*

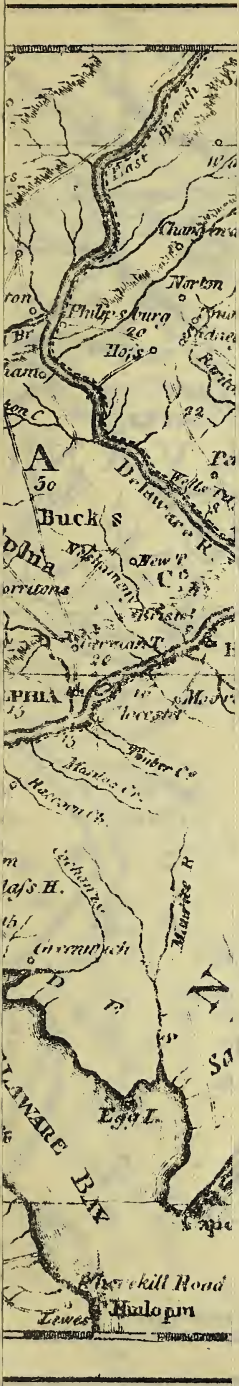
August 20th.—This morning about 6 o'clock the whole fleet got under way and stood up the bay with a fair wind. The country on each side looks extremely pleasant. In the evening about 7 o'clock the whole came to anchor opposite Poplar Island, a few miles from Annapolis, in about seven fathom water.

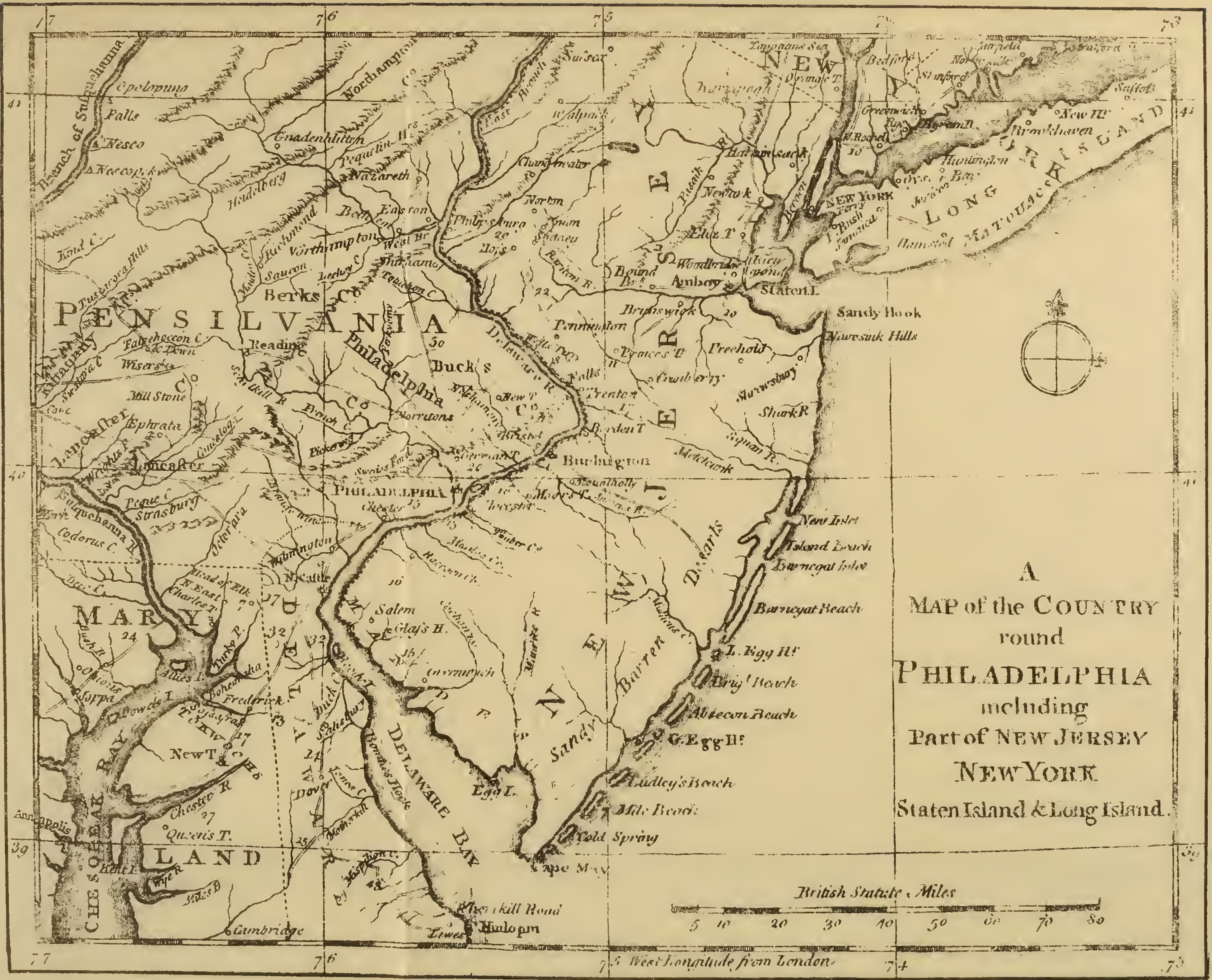
August 21st.—This morning at daylight the fleet got under way and continued up the bay with a fair wind. About 9 o'clock we passed Annapolis, the metropolis of Maryland, a large town all of brick. The rebel colours were flying on both points of the entrance to the river, and there appeared to be some kind of works. Opposite to the town is a little creek where are four or five small vessels at anchor. Our Admiral, we suppose, has given orders that they shall not be molested, for none of our ships or boats have been sent in shore or fired a shot. About noon we passed Maggoty Creek, and about 3 came to anchor at Swan Point. All the morning the rebels were firing cannon along the shore, we imagine to give the alarm and collect themselves. We heard yesterday that General Burgoyne had given the rebels a severe thrashing near Albany.

August 22nd.—The fleet got under way in divisions and sailed up the bay as far as Sassafras Creek, and came to anchor not far from Baltimore about 11 a.m. The water is here very shallow and the channel narrow. Ships are sent on ahead to sound and place the marks upon the shoals, which has been done all the way hitherto, so that not one vessel has yet run ashore, though so numerous, and the bay so full of sands. It is no doubt a wonderful sight to the Americans. The country on both sides appears a good deal cultivated and looks very beautiful. We came to anchor about noon a few miles from Turkey Point; in an hour after we got under way again and went nearer to the Point and came to anchor.

August 23rd.—This morning we got under way and went up to Turkey Point, and just at the entrance of Elk River we came to in about three fathom water. The country up the bay towards Susquehanna River looks delightful. Several of our small vessels and boats are sent in shore to sound the depth of water; they go in shore without being in the least interrupted by the inhabitants, and it seems worth remarking that we have not had a single shot fired at us from the shore since our entrance, though the ships have sailed and anchored far within musket shot several times. We have seen several of the rebels on the shore and about their houses, and a good number of cattle, by which it seems they either did not expect us here or are well disposed towards us. We are now expecting orders to land every hour. Our guns and stores are all in readiness. It is imagined by some of us that the General's plan is to land all the troops at this place and proceed to Philadelphia, which place is not above fifty miles from us, and that the shipping will return and join us again up the Delaware. This morning early the Admiral and the General went in their barges up the Susquehannah River and other places, also up the Elk River to sound the water, and we imagine to find a convenient place for landing. They were out from 5 a.m. till 2 p.m. They went on board the *Roebuck* to dinner, as the Admiral's ship lies off Sassafras River at some distance. A very heavy storm of thunder and lightning this evening.

(To be continued.)


East Branch
Changewater
Norton
Philipsburg
20
Hois
22
A
30
Bucks
Delaware R.
New T.
Neshaminy
C
Bristol
Germant
20
LPHIA
15
Chester
Timber Cr.
Mantua Cr.
Raccoon Cr.
Mass H.
Greenwich
Maurice R.
D
E
Egg I.
LAWARE
BAY
Cape
Whorekill Road
Hinlopen
Lewes



A MAP of the COUNTRY round PHILADELPHIA including Part of NEW JERSEY NEW YORK Staten Island & Long Island.

WIRELESS TELEGRAPHY & ITS MILITARY POSSIBILITIES.

BY

CAPTAIN W. P. BRETT, R.E.

(*A Lecture delivered at the Royal Artillery Institution, Woolwich, Thursday 9th Dec., 1897*).

Major-General F. T. Lloyd, C.B. in the chair.

THE Chairman—Ladies and gentlemen, I have much pleasure in introducing the Lecturer to you; he is known to most of you, and I can only say that I am sure that all in this large and distinguished audience must look forward to his very interesting account of the progress made in that wonderful science of "Wireless Telegraphy." I will not intervene between you and the lecturer but will beg him to commence.

Captain Brett—General Lloyd, ladies and gentlemen. No excuse I think, is needed for bringing this subject to the notice of a military institution, as the successful conduct of military operations is at the present day largely dependent on the facility with which intelligence can be transmitted and orders conveyed.

It is necessary to remark at the outset that by the expression "wireless telegraphy" it must not be understood that electric conductors are entirely dispensed with, as will be evident if you will look for a moment at the number of wires about the floor and roof of this room. The term implies only that intelligible signals can, under certain conditions, be exchanged between two stations without their being connected with each other by the usual conductor. In fact, by one of the systems which I shall try to explain to you, a greater length of conducting wire is required than with the ordinary direct method, but the wire is not run between the two stations. On the other hand, with another system, which I shall call "Marconi's," the amount of conducting wire is reduced to quite a small amount.

There is a tendency on the part of many people to form a somewhat exaggerated idea as to the capabilities of any new scientific discovery or invention, so that it will not be out of place to tell you at once that there is no sign yet of any system of wireless telegraphy which will come as a rival to the existing telegraphic methods, or even to the visual methods of signalling adopted in the naval and military services. But there have now been discovered some *additional* facilities for communication which may, under certain circumstances, prove of great value. The tendency to over-estimate the capabilities of a scientific contrivance is very natural, for the general public can do little else but take the opinions of well-known scientific men, some of whose statements should be accorded a poetic license. I have in my mind an article on "Some possibilities of Electricity," which appeared in February, 1892, in the *Fortnightly Review*, and attracted considerable attention at the time. I hope you will bear with me if I read a few short extracts from this article, which, prophetic in 1892, is still prophetic. The only thing that can be claimed is, that one step (perhaps a considerable one), has been made towards fulfilment.

Fortnightly Review—February, 1892:—

"Whether vibrations of the ether, longer than those which affect us as light, may not be constantly at work around us, we have, until lately never seriously enquired; but the researches of Lodge in England and Hertz in Germany give us an almost infinite range of ethereal vibrations or electrical rays from wave lengths of thousands of miles down to a few feet. Here is unfolded to us a new and astonishing world—one which is hard to conceive should contain no possibilities of transmitting and receiving intelligence. Rays of light will not pierce through a wall, nor, as we know only too well, through a London fog; but the electrical vibrations of a yard or more in wave length will easily pierce such mediums, which to them will be transparent. Here then is revealed the bewildering possibility of telegraphy without wires, posts, cables, or any of our present costly appliances. Granted a few reasonable postulates, the whole thing comes well within the realms of possible fulfilment.

* * * * An experimentalist at a distance can receive some, if not all, of these rays on a properly constituted instrument, and by concerted signals, messages in the Morse code can thus pass from one operator to another. Any two friends living within the range of sensibility of their receiving instruments, having first decided on their special wave length and attuned their respective instruments to mutual receptivity, could thus communicate as long and as often as they pleased by timing the impulses to produce long and short intervals on the ordinary Morse code. * * * * This is no mere dream of a visionary philosopher. * * * * Even now indeed" (remember speaking in 1892) "telegraphing without wires is possible within a restricted radius of a few hundred yards." In spite of this prophecy we are not yet within a reasonable distance of seeing our familiar telegraph posts and wires disappear from the face of the earth, however desirable from an æsthetic point of view such a consummation might appear. We may expect this when the facilities offered by telegraphy without wires are equal to or greater than the facilities given by the use of wires. At present this is very far from being the case. Nor can one at present see the *probability* even of wireless telegraphy ever equalling in its facilities of communication telegraphy with wires, although no one will venture to set limits to the *possibilities* of scientific discovery.

I should make one word of personal acknowledgment before putting before you the two systems by means of which a certain degree of success has up to the present time been achieved. I must myself own to a certain degree of diffidence in bringing the subject forward, as being by no means the individual best suited to do so. Partly from curiosity, but mainly with a view to investigating the possibilities of wireless telegraphy from a service point of view, I was induced to make some experiments with apparatus of my own design, and constructed under my own supervision, following as best I could any instructions I could obtain, the best of which, however, were somewhat meagre. The results obtained were encouraging, and the subject soon exerted a fascination, so that I placed myself in communication with those experimenting on the same lines, from all of whom I received the greatest assistance. Much of the apparatus you see in the room was lent me by various people. Amongst others I might mention Mr. Preece, of the General Post Office, Mr. Gavey, of the General Post Office, Professor Sylvanus Thompson, who lent me that most ingenious wave model of his which he showed at the Royal Institution; Signor Marconi, who is unfortunately prevented by indisposition from being here to night; Captain Kennedy, R.E., who has taken up the subject very keenly indeed; and, last of all, Major Carr, R.E. I was fortunate in having the services of Q.M.S. Faussett, R.E., to whose mechanical skill I am much indebted (applause). It may be interesting for you to know that the War Office authorities are alive to the importance of the subject, as shown by the fact that they have appointed an officer to watch the experiments carried out under the auspices of the G.P.O. Some think that the time has arrived for the War Office to institute a few experiments on their own lines, carried out under purely military conditions and for purely military purposes.

After this, I am afraid, rather long and tedious introduction, I must at once proceed to explain to you one of the systems under consideration. Taking the subject in historical order, I shall first describe what is known as "Preece's system."

Early in 1895 the cable between Oban and the Isle of Mull broke down. Here was the opportunity of putting this system to a practical test; it was at once seized upon, the apparatus was installed, and communication established by using parallel wires on each side of the channel (I believe about 3 miles across), and transmitting signals across this space by means of these (so-called) electro-magnetic waves. Previous to this, in 1892, intelligible signals were experimentally transmitted from Penarth to Flat Holm in the Bristol Channel —a distance of a little over 3 miles. It was the experience gained in those experiments which led to the particular arrangements adopted at Oban, and these arrangements I shall describe shortly. It was not by utilising any new scientific discovery that Mr. Preece was able to do this, but, making use of certain scientific facts shown by Faraday and Henry as laboratory experiments, and bringing them up to date by using the telephone as a detector, he was able to achieve success over distances previously considered impossible. (If Faraday had known the telephone what would he not have discovered !)

Let me show you the fundamental experiment on which the system depends. I am rather ashamed of the simplicity of the contrivance, and the only excuse I have for showing it to you is that this is the original experiment of Faraday and carried out probably by the very apparatus that Faraday used. Here it is (*showing it*). It was picked up covered with the dust of years at the R.M.A., where it had been lying, I am afraid to say how long; and of course you know that Faraday was once science lecturer at that Institution. First of all a little explanation is necessary before showing the experiment itself. One of the best known phenomena connected with the electric current is, that in the vicinity of a wire conveying it, magnetic forces are experienced which disappear when the current ceases to flow. Now I will ask you to imagine a wire stretching from this wall to that across the room. Suppose a current to be started in that wire by depressing a key. The current at first is zero in strength and rises to its steady maximum value, taking usually only a very small fraction of a second to do so. During the time of the current rising there are thrown off from the wire conveying it, as from a centre, a so-called electro-magnetic wave. Suppose another parallel wire stretched across the room and forming part of a closed circuit, the expanding electro-magnetic wave will wash this second circuit, or a portion of it, and a converse action will take place, that is to say a momentary current in this second circuit will be induced. I say momentary, because this wave motion ceases when the current has attained its steady value. Suppose the current in the first wire to be now suddenly broken; the ether is released from a state of strain, and a wave in the reverse direction results, causing a second momentary current in the distant circuit.

(Experiment shewn:—Two parallel coils of insulated wire, separated from each other by a few inches of air. One coil connected with a battery and key—the circuit of the other closed through a galvanometer. On depressing key, a momentary disturbance on galvanometer results. On releasing key another momentary swing of galvanometer needle in opposite direction to the first is seen).

In the experiment just shown, when the key is depressed I ask you to imagine an electro-magnetic wave, which starting from the surface of the first coil, washes the second coil whose circuit is closed through the galvanometer, and you notice the galvanometer needle swing. On releasing the key the strain is released, and the return wave is started. Accordingly a momentary deflection on galvanometer, but in the opposite direction results. The effects are small and weak, you see, in the extreme, but that illustrates from what small beginnings practical results sometimes follow (applause).

This, then, is the laboratory experiment, the parent of the system of the wireless telegraphy we are considering. We can gather from this experiment what are the desiderata to enable the actions just described to take place across sufficient space for practical use in transmitting signals. In the receiving apparatus, first of all, we must have an instrument very much more sensitive than any galvanometer yet constructed, and one, moreover, that is better able to respond to impulses which rapidly alternate in their character. This we find in the telephone, which takes the place accordingly of the galvanometer. In the transmitting apparatus we require to produce, (automatically for choice) sudden rises and falls of current (current rushes), and the more sudden the impulses the better will the distant telephone respond. In addition to this we want two parallel circuits of considerable length.

I have here arranged two such parallel circuits a few yards apart across the room and completely separated from each other by an air space. One of the circuits (the receiver) is closed through a simple telephone. Tho other, the transmitting circuit, contains a battery, key, and, in this instance, a simple automatic interrupter. The interrupter "makes" and "breaks" the circuit with considerable rapidity—about 260 times a second—and on holding the telephone of the receiving circuit to the ear, the current vibrations are detected. If the transmitting key be depressed for long and short intervals of time in accordance with the Morse code, the signals can be read accordingly.

(Experiment shewn:—Sending a message across the room, one of the audience taking the message on the telephone).

The current interrupter used in this experiment is really a small motor used for driving a small ventilating fan. The fan is removed and an automatic interrupter substituted. The experiment just shown was carried out with what is really a model of Preece's system (applause).

It appeared to me at first somewhat a disadvantage that the vibrations of that receiving telephone cannot be heard all over the room, but this fact will serve to emphasize the main drawback of the system, namely, the great weakness of these transmitted signals, natural enough, seeing that the energy which operates the telephone is only a very small fraction of the energy radiated and the source of the energy that produces the signals is situated at this distant station.

I may at once attract your attention to the difference in the nature of the signals received with Preece's and with Marconi's apparatus.

(Experiment shewn:—A few signals from a "Marconi" transmitting apparatus sent to a "Marconi" receiving set at the far end of the theatre. The noise of the vibrating hammer of the receiving set was heard all over the theatre).

The apparatus which signalled is one I had specially made to make noise enough to be heard all over a large room; it is not one of Marconi's own sets, though constructed on his principle. Marconi's sets are very much more delicate and sensitive. I shall shortly show you one (applause). In Marconi's system a contrivance at the receiving station—which is very sensitive to these etherial waves—sets in action energy located *at* the receiving station. The audible signals are produced, not by this very feeble amount of energy transmitted, but by a local source of energy, viz: a voltaic battery put in action by the transmitted energy. There are many devices in common use for putting in action energy situated at a distant station, and for an example I might give you the illustration of firing a gun electrically. You have a gun tube in the gun, a key some distance off, and a battery located anywhere; and the only amount of energy that you have to put into the circuit is the small amount required to depress the key, but that sets in action the battery; the battery sets in action the gun tube, and the gun tube brings in action the huge amount of potential energy stored up in the cartridge. So that you see that there is nothing new in the arrangement of using a small amount of energy to bring into action a much larger amount. It is done in ordinary telegraphy by means of instruments called "relays."

Before passing on to the consideration in detail of Marconi's system I would like to show you a diagram on the screen of Preece's system. It will be interesting to many of you who are in the habit of following out electrical diagrams, to observe the method adopted by Mr. Preece to secure the desiderata above-mentioned—viz: great suddenness (see Plate I) in the making and breaking of as large a current as possible. [Diagram No. 1 was thrown on the screen.] The diagram (Plate I) shows that on both sides of the channel to be crossed, the ordinary "Morse Key" circuit is made. The current interruptions are produced by a commutator driven by a small auxiliary motor. The suddennes of the break is increased, and the sparking reduced by a condensor placed across the commutator terminals. I suppose at Oban the length of this wire was about 3 miles, and each end was connected to earth plates. Exactly similar circuits being arranged on both sides of the channel, a buzzing in the telephone at the distant station is produced as long as the Morse key at the near station is kept depressed. Hence signals can be *exchanged* between the two stations by the Morse code at about the same speed as ordinary telegraph signals.

Mr. Preece says that for good effect it is necessary to erect parallel overhead wires *of similar length to the distance to be crossed* on *each* side of the channel. You will remember that I told you that in this system you really need more wire than is necessary for connecting directly. For good effect you require as much wire on the one side of the channel as you have on the other, and parallel to it. When earth returns are used in each circuit it is necessary to stretch the wires as much as possible above the surface of the ground. Some of the disadvantages of the system will at once be obvious. (1)—The extreme weakness of the signals renders it impracticable to call attention. It is impossible for an operator at a distant station to know that a message is being sent unless he has his ear perpetually at the telephone. (2)—The system is only possible when two parallel wires of considerable length can be stretched at some height on either side of the channel to be crossed. This renders it impossible on a lightship or rock lighthouse. There are many small islands for example where it cannot be done. On the other hand when signals are successfully transmitted they are very clear and very easily read, and the signals are not likely to be confused by disturbances from other sources. Marconi signals, on the other hand, are to a certain extent liable to confusion from unforeseen disturbances such as a flash of lightning. I do not know whether the Marconi system has ever been tried in a thunderstorm, but there appears to be some element of danger from this cause. If a satisfactory form of delicate relay could be devised which would bring in action a local battery, the first and most serious disadvantage of Preece's system, which I spoke of, would be remedied. It is a difficult problem, but I believe not impossible. I am not quite certain whether a certain degree of success has not been attained already, and I think apparatus is now being experimented with which promises success.

I shall now leave Preece's system, which serves fairly well as a introduction to a more recent invention—which I shall call Marconi's system. To sketch the development of what is called Marconi's system is to show how truly cosmopolitan science is. The system really may be said to be the result of the study of one of the oldest phenomena known in electricity, namely, the electric spark.

Forty or fifty years ago it was discovered that a spark from a Leyden jar is under certain conditions oscillatory in character; it consists *not* of a single discharge from one point to another but of a series of surgings to and fro, the oscillations continuing until the energy of the discharge is exhausted, the whole discharge occupying, however, only a very small fraction of a second of time. This was probably known to Faraday in England and Henry in America. In 1855 Lord Kelvin gave the mathematical conditions for a spark to be oscillatory. Perhaps the best anology to give is the release of a stretched spring. When a spring under tension is *suddenly* released it does not contract to its original dimensions, but vibrates backwards and forwards with a series of oscillations. The instant before the spark leaps across the gaps separating the spheres of the transmitting instrument (shewn) on the table, the space bewteen the spheres is in a state of strain. The fact of a spark passing, is the outward and visible sign of the *release* of this state of strain, and in the same manner as the spring, the electricity surges backwards and forwards with vibrations of ever-diminishing amplitude, until the discharge is complete. Every sudden discharge then consists of a series of surgings, but with so great a rapidity do they take place, that the whole discharge appears practically instantaneous to the eye.

Shortly after Lord Kelvin's mathematical theory was enunciated, Clerk Maxwell developed his famous theory of the identity of electric waves and light waves, and showed that while an electric oscillation is in progress there must be thrown out at right angles to the line of oscillation—in this instrument (see Plate II) the line of oscillation in the line joining the centres of the spheres—an electromagnetic wave which moves with the same velocity as light but is of different wave length and frequency. Seeing that the time occupied by a single one of those oscillations may be less than one hundred millionth part of a second, it may be gathered what difficulties lay in the way of experimentally verifying Clerk Maxwell's theory, and the theory remained for many years little more than a pious belief among the school of mathematical physicists founded by Maxwell, and was doubted by a great many scientists—especially on the continent. However, it remained for a scientist on the continent,—Hertz in Germany,—to set all doubts at rest and to triumphantly vindicate Maxwell's theory; for by a brilliant series of experiments he demonstrated in a conclusive manner the existence of those electro-magnetic radiations; and not only that but proved that the waves are capable of being reflected, refracted and polarised,—they showed, in fact, all the phenomena of Light waves.

The fact which enabled Hertz to detect the radiations is this:—If a series of electro-magnetic waves, set in motion by electric oscillations, find in their path a conductor or system of conductors, they tend to set up an electric oscillation in the conductor, which will be the more marked if the conductor by reason of its capacity, inductance, and resistance, tends to oscillate electricity with exactly the same frequency as the initial oscillator, in which case the action is called resonance. This action can be illustrated by a very well-known phenomenon connected with sound waves. If anyone strikes a tuning fork in the vicinity of a number of different tuning forks, those forks whose note is the same or a harmonic of the forks struck, will be set vibrating—and again let any one sing a sustained note close to a piano, he will notice that the piano wire tuned to the same note will vibrate as also will its harmonics in a lesser degree.

Similarly with electric vibrations. I do not ask you to believe this statement without showing you something in the nature of an experiment confirming it. I must ask you to accept this fact: When you see a stream of sparks across the spheres of the transmitting apparatus (Plate II.) you must imagine that each spark consists of a number of oscillations taking place perhaps at the rate of about 250,000,000 per second. *Each* oscillation starts an electromagnetic wave at right angles to the line of oscillation; the wave moves outwards with the velocity of light, 186,400 miles per second. The wave length is accordingly about 4 feet long. I place here in the path of the waves a conducting system (receiver) similar to that of the transmitter. The receiver consists of two pieces of pointed carbon rod supported by two brass rods. At the outer end of the carbon rods two copper "wings" are fixed, the function of which are to tune the receiver, more or less, to the transmitter. A minute gap separates the carbon rods. If the key controlling the transmitter be depressed (causing sparks to pass across the transmitter spheres) a series of sparks can be observed to pass across the small gap between the carbon points, although no material connection of any kind exists with the transmitter. (Experiment shewn:—The fact of the sparks passing confirmed by one of the audience).

These sparks are visible only by careful and close observation, but in order to make the fact obvious to everyone in the room, I adopt an expedient to show unmistakeably to everyone that the sparks really pass across the gap. I connect to the two sides of the receiver, wires from the dynamo in the base of the building, between which a considerable electrical pressure exists. Nothing will happen until a spark passes, but immediately this occurs the obstruction formed by the air gap "breaks down," and the well-known brilliant electric arc is formed between the carbon points.

(Experiment shewn:—Wires from dynamo connected one to each side of the receiver gap. On pressing the "transmitter" key a few feet away the electric arc immediately started).

The assistance of a dynamo is not absolutely necessary to shew you all, that electrical oscillations are produced in this receiving apparatus owing to the primary oscillations of the transmitting apparatus. For if I connect a small "vacuum tube" across the gap of the receiver, you will see the tube glow strongly when sparks are caused to take place across the transmitting apparatus.

(Experiment with vacuum tube shewn).

It is not, perhaps, an easy thing at first to grasp, that when electrical oscillations are produced, electro-magnetic (Hertzean) waves are thrown out at right angles to the line of oscillation. These waves in their turn are able to excite similar (but less intense) electrical oscillations in a suitably constructed receiving apparatus at a distance.

These "wave models" may assist you. I am indebted to Professor Sylvanus Thompson for the loan of the large model. It is the model he exhibited at the Royal Institution not long since. The communication of an oscillation from one swinging body to another at a distance becomes beautifully evident, the intermediate mechanism being in the model a long row of leaden balls suspended in a peculiar manner.

Captain Kennedy lent me the smaller model, whose action is similar, though there are in his model one or two ingenious improvements. These are, I believe, the only two models of the kind in existence.

(Models shown and action explained in more detail).

The mechanism that transmits electrical oscillations is invisible to us. "Ether" is the name given to the medium in which the wave motions take place, and there is no doubt that by some transverse undulations in this medium, the electro-magnetic (Hertzian) waves as well as light waves are conveyed. No one knows what the actual "mechanism" of the ether is (if one may use such a term) but knowledge is gradually being gained on the subject.

The experiment just shewn you serves very well to indicate the nature of the apparatus required for transmitting signals by means of these Hertzian waves. Besides the transmitting apparatus producing the waves we require a detector of such waves. Moreover the detector will produce a more visible signal of it and serves to bring into action some local source of energy, so that the fact of the arrival of the wave may be demonstrated in a more energetic manner. For instance, the local source of energy in this experiment was a dynamo in the base of the building, and connected with either side of that gap it served to bring into action the energy developed by the dynamo, and everybody saw the electric arc which it produced.

The wave can be *detected* by a minute spark only visible by careful observation, or by a vacuum tube; but by far the most sensitive arrangement is the "coherer" to which I now draw your attention. The spark arrangement would perhaps act at about double the distance I have it (about 4 feet) but not further; the distance at which the vacuum tube will perceptibly glow is smaller still; but the coherer is extremely sensitive to these electro-magnetic waves. It consists mainly of a glass tube in which are two silver plugs, separated by a very short distance, the space between them being half filled with metallic filings. this little tube of glass with the metallic filings is the soul of the Marconi apparatus.

(The coherer shewn; and a few distributed among the audience).

In order to explain its action I must make a slight digression. Some time ago the discovery was made that a tube filled with metallic filings in a finely divided state offers a large resistance to the electric current—in fact it is practically a non-conductor. Possibly each particle is surrounded by a film of gas.

Then experimenters after Hertz noticed the curious fact that a tube such as I have described immediately becomes *conducting* in a greater or less degree when Hertzian waves impinge on it, the drop in resistance depending on the intensity of the radiation falling upon the tube. It was found that this form of detector was extraordinarily sensitive. The simplest way of using such an instrument to detect waves would be to connect a single voltaic cell with a galvanometer in circuit with it. Owing to the high resistance of the coherer little or no deflection is produced on the galvanometer until a wave of sufficient intensity impinges on the coherer. Immediately this occurs the resistance of the coherer drops, and a current flows showing a deflection on the galvanometer.

(Experiment shewn:—Coherer suspended across the gap of the receiving instrument and placed in simple circuit with a single voltaic cell and galvanometer. Immediately a spark took place across the transmitter, the galvanometer showed a full deflection).

It will be observed that the "cohersion" remains after the exciting cause is removed, and the galvanometer will shew a deflection for an indefinite time, unless the original non-conducting state of the coherer is restored. This can be done by mechanically shaking up the filings with one or two smart taps. The receiver is then in a position to record a second signal.

(Experiment shewn: The coherer was tapped and the galvanometer needle again returned to zero).

You see that the coherer is the soul of the apparatus. Now the problem was to make use of the coherer to give audible signals, and in order to do that, Mr. Marconi had to arrange an automatic method which, when the signal is over, caused the coherer to be tapped and the signal to cease. What happens in the coherer is a matter of conjecture, but it would appear as if the oscillations induced through the metallic filings cause the films between these fine particles of metal to break down and produces partial welding together or cohesion of the filings—hence the name "coherer," the most apt name that I think could be given to it.

All the facts which I have just mentioned were in possession of the scientific world before Marconi showed that intelligible signals could be sent over distances exceeding one mile. Previous to this the distance signalled was about 40 yards, and the opinion appeared to be held by scientists of the highest repute that half a mile was about the limit. There would appear to be a tendency on the part of some scientists to deny credit to Mr. Marconi on account of these facts being previously known; but it is undoubted that Mr. Marconi was the first to produce apparatus on the above-mentioned lines by which *readable* signals could be produced over a useful distance, that is more *than one mile.*

Here I would draw attention to a point frequently lost sight of, that it is a great step from simply *detecting* waves with this apparatus to making this apparatus record *organised signals* conveying an *intelligible message.* The credit for this would appear to be due to Mr. Marconi, thus raising an instrument from the rank of a scientific curiosity to that of a practically useful piece of apparatus (loud applause).

Let me give you a short description of the Marconi apparatus (see Plate II).

(The second diagram was thrown on the screen.)

The transmitter is a modification of the pattern devised by Professor Righi. The oscillations are produced across a system of four solid brass spheres. The gap between the two centre spheres is about a millimetre long; the outer gaps are longer and adjustable according to the spark length employed. Connection is made to the secondary of an induction coil capable of giving a spark up to about 10 inches in length. A simple key is inserted in the primary circuit, on pressing which for a short or long period, a stream of sparks of short or long duration may be produced across the spark gaps of the transmitter, thus causing radiation of the waves under definite control. The short and long discharges correspond to the dots and dashes of the Morse code.

Two points about the transmitter will attract attention. First of all there is the parchment jacket filled with rosin or vaseline oil which surrounds one half of the centre spheres. The main object of the oil bath is to keep the surface of the centre sphere clean and polished. It is essential for the production of this electrical radiation that the spark shall "snap" across very sharply, and to secure this the surfaces between which the spark passes must be kept clean, smooth and highly polished. Secondly the "wings." These are very much in evidence and attract the eye at first more than anything else. As a matter of fact the instruments within this theatre would work probably as well without these wings. Their object may be stated to be: (1), to lengthen the line along which the oscillations take place, and in consequence to increase the space influenced by the radiation; (2), to impress a definite wave length upon the radiations so that the receiving apparatus provided with similar wings may respond more readily to the influence by the action known as resonance, analogous to the tuning previously mentioned.

This resonance effect is not so essential to the action as was once thought, as the receiver is not very discriminating as regards the exact wave length to which it will respond, but at extreme distances it may be important to tune the receiver to the transmitter. For sending over long distances those wings are done away with. (See Plate III.)

(The third slide was thrown upon the screen.)

In place of the wings one side of both receiving and transmitting apparatus is connected to a vertical wire; the other side to earth. The height of the vertical wire necessary depends on the distance signals are to be sent. A height of 100 feet at each station has been found sufficient for transmitting about 3 miles (using an induction coil, giving about a 6 inch spark). With a vertical height of 200 feet signals were sent a distance of over 8 miles. The diagram (Plate III.) shews how a kite was employed to raise the vertical wire. There is no reason why the arrangement should not be simplified by using an aluminium wire as the kite-string, the kite-string would then form the "oscillating line." It is found sometimes that it is unnecessary to "earth" the receiver. The transmitter should, however, be well. "earthed" when using the vertical wire.

Some of you may have noticed in the Entrance Hall, as you entered a piece of apparatus which was lent me by Captain Kennedy, R.E. It is the Marconi receiving apparatus, but there are certain little mechanical details which do Captain Kennedy a good deal of credit on account of the ingenuity with which they are worked out. I propose to put this apparatus to a very practical test by sending a message to it from the transmitting apparatus on the table. I shall first attach this vertical wire (about ten feet long) to one side of the apparatus, and connect the other side to earth. The receiving apparatus outside has a similar vertical wire, but the earth wire is omitted. The receiving instrument has also connected to it, in "parallel" with the tapper, a "Morse Recorder," an instrument which registers the message sent in dots and dashes upon a running tape. I should be glad if someone would accompany the Quarter-master-Sergeant outside to see if the instrument is working, and bring in the message recorded.

(Experiment shewn :—One of the audience went to the receiving instrument outside. A few letters were sent on the Morse code from the transmitting apparatus. The tape with the message recorded was brought back, and handed round for inspection).

You see that a moderate thickness of brickwork and doors will not prevent the passage of these electrical waves. The message, as you observed, was sent very slowly, but you must remember this apparatus is in its infancy, and infants must learn to walk before they can run.

The principal portion of the receiving apparatus is the coherer.

Marconi's coherer (Plate II.) consists of a small glass tube 1½ inches long and about $\frac{1}{10}$ inch internal diameter. In it are tightly fitted two silver plugs whose faces are separated by about $\frac{1}{30}$ inch. The small space between them is half filled with fine metallic filings, chiefly of hard nickel, with a small admixture of silver. The air is exhausted from the tube until a considerable vacuum is produced, and the tube is then sealed. A vacuum is not absolutely necessary, but desirable. In my opinion its object is to ensure that the interior of the tube is quite dry. The action of the coherer when oscillations are excited through the tube has been previously described. The terminals of the tube are connected in simple circuit with a single dry cell and a "relay" of Post Office pattern. The current through this simple primary circuit is not sufficient to actuate the relay, until the oscillations are excited. When this occurs, the relay tongue moves over, and establishes a current through a local circuit containing a "tapper," and a comparatively powerful battery. The function of the "tapper" (constructed like an electric trembling bell) is to strike the coherer and bring about mechanical de-coherence *i.e.*, restitution of the coherer to normal non-conducting state. Therefore as long as waves fall on the coherer the tapper continues to strike it, and the motion of the tapper ceases when the electrical waves cease.

The sound made by the tapper is generally sufficient to enable the signals to be read, but should it be necessary to record the signals, a "Morse inker" is placed in parallel with the tapper and the signals are then registered on a tape according to the Morse code.

In the diagram—Plate II—the Morse inker is not shewn.

(Experiment:—The action of the tapper on a receiving apparatus placed in the theatre was shewn.)

To ensure successful signalling over any but quite short distances there are a number of details to be attended to which it would be out of place to enter into here, and I think it is time now to give you some idea as to what has been done up to the present.

Mr. Marconi has kindly furnished me with the following statement:—At Salisbury good readable signals were transmitted a distance of from 5 to 6 miles during a series of experiments early in the year. More recently he tells me a distance of 8 miles has been covered at the same place. Some experiments were made in signalling across the Bristol Channel near Cardiff. Success was achieved in transmitting signals from Lavernock to Flatholm, 3½ miles, and subsequently from Lavernock to Brean Down, 9 miles. I am, by the kindness of Major Carr, able to show the records of two of the actual signals sent from Lavernock to Flatholm on 13th May, 1897. (Tape records shewn.) It will be seen that the messages are perfectly readable by anyone acquainted with the Morse code.

At Spezzia, in Italy, messages have been sent from ship to shore, a distance of 12 miles, and I am told that the Italian Government are giving the system a practical trial for naval purposes.

The most recent experiments carried out by the General Post Office have taken place at Dover, but the main object of these appears to have been to discover more precisely the conditions necessary to assure success rather than to work through any record distances. This is the apparatus actually used at Dover (apparatus shewn). I am indebted to Mr. Gavey, of the G.P.O. telegraphs, who lent it me for the purpose of this lecture. It was Mr. Gavey who conducted the Post Office experiments at Dover and elsewhere.

(Experiment shewn:—The great sensitiveness of the Dover set was shewn by the fact that it could be set in action from the minute oscillations produced by an ordinary trembling bell.)

It is not very well known to most people, perhaps, that when they ring an ordinary electric bell in a house they are setting Hertzian waves in motion. That is, however, a fact; and advantage is taken of it to test the sensitiveness of a Marconi receiving set. I have here (shewn) a small electric bell and a single cell. You will see that the very feeble electro-magnetic waves sent out when the bell is rung will work this sensitive apparatus at a distance of two or three yards (applause).

It has been stated that "weather seems to have no influence, and that rain, fog, snow and wind avail nothing," but in the light of more recent experiments it would appear that some slight influence is exerted by rain and mist affecting the distance over which transmission is possible; and further that signals may be sent a greater distance across water than across land. Perhaps it would be desirable to add that these last statements are personal impressions formed from experimental results up to date.

I have entered into some detail regarding the apparatus for signalling in both Preece's and Marconi's system, because the nature of the apparatus determines to a great extent the uses to which it can be put.

As to which of these systems is most capable of general application I have little hesitation in expressing my own opinion, that Marconi's shows greater possibilities than the other. The conditions are more elastic. It is not always feasible to run two parallel circuits of considerable length, and as for *experimenting* with Preece's system it is practically impossible for private individuals who have not a large estate at their proposal or the facilities of the post office authorities. I may tell you that I have not made any experiments over long distances with Preece's for the reasons I have just given. I have, however, made experiments over a considerable distance with the other system.

The vertical wire has been condemned as the greatest disadvantage of Marconi's system, but to raise a vertical wire is a more feasable and rapid operation than running a long line of elevated insulated wire. In a wind a kite will raise the wire, and in a calm a small balloon might be used. Tall trees, steeples, flag staffs, towers, or cliffs can be taken advantage of as occasion offers. It appears to me that one of the drawbacks of Marconi's apparatus is the necessity of providing a powerful and efficient battery for working the induction coil. That would perhaps limit its use in the field where one knows what a trouble it is to make up really good and powerful batteries. Secondary batteries are the best. No doubt the fact I have just mentioned would militate a good deal against the employment of this system in the field. Of course dry cells can be used, but dry cells will not last very long and I do not think we have much experience as to how dry cells would stand the rough conditions of service in the field.

When an interchange of messages between two stations is required there must be, of course, a transmitting and a receiving apparatus at *each* station, and it would appear that your own receiving apparatus would respond to your own signals. Where there are only two stations concerned that is not much disadvantage, but where there are more than one pair of stations established within a short distance of one another, and they are exchanging messages simultaneously, the signals would get hopelessly mixed unless by some process of tuning the receivers can be made to respond only to waves of some selected and adjusted wave length. Mr. Marconi, I believe, claims to have accomplished this, but in what manner I must express my inability to tell you.

When treating of the military possibilities of the system, I must be allowed to use the term military in a very wide sense. The navy, of course would be most benefitted. Fully equipped with electrical appliances and provided with a mast as support for the vertical wire, communication of orders from a Flagship to ships of the squadron will be facilitated, while it should be possible for ships to receive intelligence from shore, say from a coast-guard station, without the necessity of coming into harbour.

Unless the receivers can be tuned, the use in the presence of the enemy appears to be impracticable as the enemy would probably be able to confuse the signals. Consider also the danger of a false signal being sent, if there was no guarantee as to the source from which it emanated! The use of cypher will get rid of this disadvantage.

Captain Jackson, of the Royal Navy, considers that one useful employment of the system would be for a friendly torpedo boat entering a harbour to announce itself by a preconcerted signal and so prevent its being fired on as an enemy. Those who know the difficulties (in connection with our experiments for coast defence), in distinguishing friend from foe, will see that this is rather an important application (applause). I might add that Captain Jackson has been most actively experimenting with the system in the neighbourhood of Devonport.

One most promising field for the employment of the system is in connection with coast defence. Very frequently it happens that communication must be established between the fortifications on both sides of a harbour or estuary. This is usually effected by a submarine cable, but those who have been charged with the duty of maintaining these cables know their liability to be picked up and broken by barges, ships, etc. anchoring or dragging anchors over them. Wireless telegraphy as an alternative would, in such a case, probably maintain communication at a critical time. To give another instance it might be possible for a beleagured garrison, especially on the coast, to establish communication outside. I fancy that many military men, engineers especially, have been getting a little frightened by the statement made in the Press that by means of this apparatus the enemy has the chance of blowing up your magazine at a distance without connecting wires to it, or there might be the chance of blowing up the magazine of a ship at a distance. I will tell you at once that it can be done; but it will perhaps reassure you to know that there would have to be some one—some traitor—who will put this Marconi apparatus into the magazine or into the ship, and it would be so much easier for him to effect his object by striking a match! I can show you that it is possible.

(Experiment shewn:—A Marconi apparatus connected to a fuze at the other end of room. On sending the wave, fuze explodes—Explosion and applause).

I should tell you that although it would be difficult for an enemy to blow up your own magazine, this last experiment shows the possibility, does it not, of your carrying out a demolition at a distance without running wires. Suppose, for example, you have to prepare for demolition a bridge, or the outbuildings of a town or village, and your wish is to keep them standing till the last moment, it would be an advantage if you could effect their destruction from some central point at a distance, and destroy them at a given moment.

I must remind you in conclusion that I have been attempting to describe a system which is in process of development. A number of experiments are at present being carried out, the ultimate result of which must be to determine definitely what can, and what cannot be done, also to increase the certainty with which signals can be sent, and I must thank you also for the admirable patience you have shown under so heavy a bombardment of electric waves (loud and continued applause).

DISCUSSION.

MAJOR R. M. B. F. KELLY, R.A.—I have been very much interested in what Captain Brett said as to the military possibilities of this form of telegraphy, especially with reference to keeping up communication between forts on the opposite sides of rivers, which has presented very great difficulties, especially where those rivers are great highways. I am afraid that one of the difficulties in this kind of communication will be the liability to interference either from your own or from other installations, and I should like to ask if there is any possibility of this form of electricity being used in connection with submarine mining and thus get over a great many difficulties which rather interfere with the full development of submarine mining in our present crowded Highways and Harbours (applause).

CAPTAIN BRETT—As regards the application to submarine mining, I do not think there is much chance of success, but I do not know that it has ever been tried. An attempt has been made to work Preece's system through water in order to communicate to Lightships. The two parallel coils of wire were placed, one at the bottom of the sea, the other round the lightship. It was thought that by this means signals could be maintained through the water; but water, especially sea water, is something of an electric conductor, and the energy radiated was absorbed in the water in the form of "eddy currents," so that very little got on board the Lightship at all, in fact it was a failure. If this were the case of oscillations of only 260 a second, it would probably be much more so with oscillations of 260 millions a second. One, of course, never likes to theorise on a thing that has never been tried, but I do not anticipate that there would be any success.

J. GAVEY Esq., Principal Technical Officer, Telegraphs Department, G.P.O.—Captain Brett has given such an exhaustive and lucid account of both the electro-magnetic and the Marconi systems that I am afraid he has left but little for other speakers to say. However, I have had the honor myself of conducting a large number of experiments on both systems on behalf of the Post Office, and perhaps I may usefully call attention to a few of the practical questions bearing on these methods of signalling. In reference to Preece's system, I should wish to call attention to one fact which I do not think is generally known, and it is this, that in the course of some experiments which I was carrying out a few years ago on opposite sides of Loch Ness, it occurred to me to replace the ordinary vibrating apparatus which has just been described, by telephones, and on connecting these to each of the parallel wires on opposite sides of the Loch we were able to exchange speech, although the two wires were 1¼ miles apart; not only this but I distinctly heard the shouts of laughter of my colleague on the other side at some puerile joke which I ventured to make. Another point is this: It is said that a length of wire is wanted on each side of the distance to be bridged at least equal to the distance itself, and that in many cases this is impracticable. There is another possibility, although we have not tried it on a large scale, namely, that the parallel wires may be replaced by large coils with numerous turns placed horizontally, and in that manner it would be quite possible to connect telegraphically an islet with the mainland where the islet itself was not of sufficient extent to admit of the necessary length of parallel wire being erected. We might place a number of coils on poles or otherwise, the same arrangement being made on the mainland, and it would be quite possible to establish communication in that way. There is also some hope that we may be able to arrange for a call because, as Captain Brett has pointed out, that is the weak point in the system at present. Mr. Sidney Evershed has designed an extremely ingenious form of relay in which a very fine wire is placed in a very powerful magnetic field, and it is possible by sending a succession of induced currents through this fine wire to cause it to vibrate and thus to close the circuit of an ordinary electric bell. I may add that we are about to establish this system practically in the Bristol Channel, and I daresay in the course of a few months we shall be in a position to give you more information on the subject.

Now turning to Marconi's system, a large number of experiments have been made not only in this but in other countries, and we have now obtained somewhat definite views of the laws which govern this method of transmission. First dealing with vertical wires it has been demonstrated mechanically, and proved practically, that within certain limits the product of the two heights bears a definite relation to the distance over which signals can be obtained. When transmission takes place over land by means of two vertical wires each 50 feet high, a range of one mile is attained, giving a product of 2500 as the square of 50. Within somewhat undefined limits the law of vertical heights holds good and is as follows:—

$$h_1 = \sqrt{h^2 \times x}$$

Where h = Height in Feet
x = No. of Miles
h_1 = Height Mercury
To reach distance x :—

Comparing these figures with the published results of the experiments across the British Channel together with others made over inlets of the sea at Spezzia, it should be possible to signal a distance of one mile with wires about 35 to 40 feet in height. The discordance in the two classes of experiments is well marked, and we can only conclude that there is a difference in the transmission of Hertzian waves over land and over water. During the course of some electro-magnetic experiments in the Bristol Channel which were conducted in 1892, we had absolute evidence that the waves were reflected from the surface of the water, and I cannot help thinking that reflection plays a very important part in the long distance experiments over seas and inlets which have been carried out in various places.

Professor Slaby, who has made experiments in Germany, has observed the same difference in transmission over land and water, and he is reported to attribute this to the fact that the atmosphere over water is freer from dust particles than on land. With all deference to such an eminent authority I cannot quite accept this as a full explanation for two reasons: first, I cannot quite realise how these minute dust particles could have much effect in reflecting long Hertzian waves; and in the second place I do not think there would be much difference in the atmosphere over the downs between Dover and Deal, and that over the water immediately adjoining. One little illustration perhaps may tend to explain how the difference may arise. If you look at the sun or the moon when rather low on the horizon, then when either is shining over intervening land, you see a general illumination and nothing more, but when shining over water you get blinding rays of light reflected from the surface, and it seems very plausible to assume that those Hertzian waves which impinge on the land are either absorbed or may be reflected right away into space, whereas on the relatively smooth surface of the water they are reflected on to the vertical conductors (applause).

Another point which no doubt will be of considerable interest to members of this Institution is how far secrecy can be maintained in this method of communication. If you erect a vertical wire and send signals through it, any person who chooses to erect another wire anywhere within the radius over which the signals can be transmitted, and to provide suitable apparatus can read your messages. Now when Mr. Marconi first introduced this system he expressed the opinion that it would be possible by suitably tuning the transmitters and receivers to overcome this difficulty. I fear, however, that with ordinary vertical wires this will be almost impossible, for it is found that instead of using two vertical conductors of the same height two of widely differing dimensions giving the same product are used and equally good signals are obtained. On looking at the question theoretically there appears to be no reason to expect a different result. Captain Brett explained how a series of surgings were set up on making contact between the induction coil and the transmitter. Now the apparatus that gives the largest number of surgings for each single original impulse consists chiefly of a Leyden jar with two short wires separated by an air gap to complete the circuit. It has been calculated that in a system of this kind, for one impulse of the coil there are 30 or 40 surgings in the oscillator. If another Leyden jar similarly fitted be placed in the neighbourhood of and within 2 or 3 feet of the former, and the two be carefully tuned, then on exciting the first or oscillator an overflow discharge is observed in the second or resonator. For this purpose tuning is absolutely imperative. With an oscillator of the Righi type fitted with short horizontal wings, it is generally considered that only three or four surgings occur for each original impulse. Now with the three or four surgings it is still necessary to tune in order to transmit over the longest possible distance, but for shorter ranges, signals can be received even if the two circuits are not in tune. When a long vertical wire, however, is used there is every reason to believe that the surgings are reduced to one oscillation. Now if we consider the effect of resonance say on two stretched wires or strings, when one is put in continuous vibration, each vibration emits an impulse which is propagated through the air on to the second wire, and when the two are in unison these impulses are cumulative in their effect so that the latter responds to and repeats the original one. If, however, the two wires are not in tune the tendency of some impulses to increase the swing of the secondary wire is checked by subsequent ones in the opposite phase, and either the secondary gives no note at all, or perhaps an intermittent and irregular one. If, however, it were arranged that one single excursion or vibration only were imparted to the primary string that impulse would be conveyed through the air and would affect any other string irrespective of its length, and I think that action takes place when vertical wires are used for Hertzian radiation, because whether the oscillation and resonator are absolutely in tune or not—you can always get the latter to respond to the former. Therefore it seems to me quite hopeless to expect to get secrecy by mere tuning when working with a system of vertical wires alone. There is another little point which goes to prove that resonance does not come in. It is found that the Righi apparatus, which has hitherto been considered the best form of radiator for moderate distances, presents no particular advantage when connected to a long vertical wire. With sufficient energy at command it is only necessary to fix small spheres on the discharging rods of the coil, for practically the radiator in this case consists primarily if not solely of the vertical wire. There is, however, one exception to this rule. If a capacity consisting of several square feet of plate copper be fixed at the upper ends of the vertical conductor, tuning becomes more effective, and to obtain the best results regard must be paid to this.

There is another point of considerable interest. Although it is necessary to have the earth connected to the radiator to obtain the best results, yet when the receiving apparatus is adjusted to record good signals, the disconnection of the earth and the substitution of a capacity consisting of a couple of feet of brass strips an inch wide sufficed to maintain communication. In other words the earth is almost unnecessary for receiving, and the electrical surging takes place simply from the vertical wire on one side through the coherer to the capacity on the other side.

Reference has been made to lightning. That is a point that requires considerable care when making experiments with very long wires. If you erect and insulate a vertical wire in ordinary fine weather and let it remain idle for a few seconds it accumulates a charge which is quite sufficient to give you a sharp prick when you touch it, and which is sufficient to actuate the coherer so that when atmospheric disturbances are rife, false signals are frequently received. It would always be wise in using very long wires to put a shunt of somewhat high resistance and self induction between the receiving wire and the earth so that it may carry off all disturbing charges. By disturbing charges I mean minor ones that would be likely to interfere with the reception of signals, because inductive lightning effects would probably pass through the shunt coil to earth, whereas the rapid oscillations due to induction would pass through the coherer. For heavy discharges, however, further precautions are needed, and it would be wise whenever using lofty conductors to provide a good lightning protector of the type used for telegraph instruments.

By the way, in connection with the question of the law of distance I should perhaps have pointed out that this law does not hold good over an indefinite distance. This is due to various causes. The extra distributed capacity of a very long wire must materially slow down the rate of oscillation. Again the rotundity of the earth cuts down the useful length of the conductor whilst probably reflection and absorption come into play, but it is without question that the law would not hold good, say for 30 or 40 miles. In connection with certain experiments made by Mr. Marconi, aided by Captain Kennedy, between Salisbury plain and Bath, a distance of some 40 miles, they raised wires into the air by means of kites to a height variously estimated as between 800 feet and 800 yards. Even if it had been only 800 feet that ought to have sufficed for communicating a distance of 520 miles if the law had held good, whereas as a matter of fact they did not get satisfactory signals at a distance of 40 miles. It may therefore be taken that the law would only hold good within very limited distances (loud applause).

CAPTAIN BRETT—I am very glad that Mr. Gavey has given us these details, especially as some of them were (I thought) confidential in their nature. The experimental conclusions regarding the law of distance are most interesting. I did not know that telephoning had been successfully accomplished with Preece's system; that is a very important advantage attaching to it, and one which, if I had known, I would have introduced in the lecture (applause).

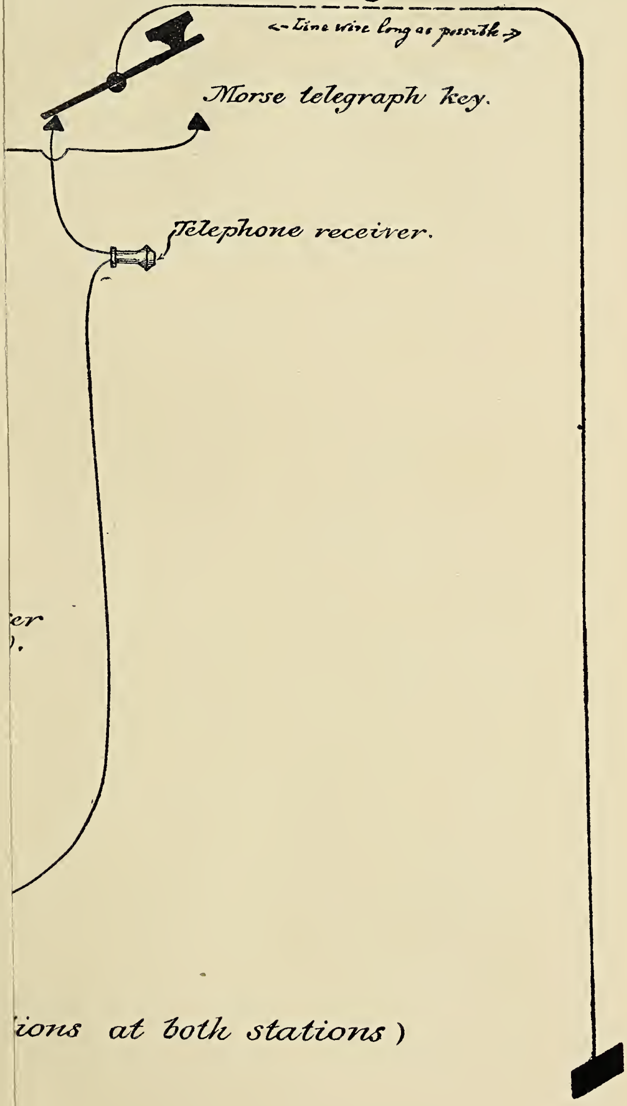
MAJOR-GENERAL F. T. LLOYD, C.B., summed up as follows:—

As the hour is rather advanced I am sure that I shall best interpret your wishes by proposing a very cordial vote of thanks to Captain Brett for his lecture, and for the charming experiments with which it was illustrated (loud applause). The nature of the communication of which he has given us the details is one that must be deeply interesting to us as soldiers and sailors first of all, but it appears from Mr. Gavey's remarks that the Post Office are experimenting in this direction, and I think that if those experiments are crowned with the success which we all hope they may be crowned with, a very great revolution will take place in the science of communicating between distant points. I will not detain you any further, and have only to offer on your behalf to Captain Brett our best thanks for his very interesting lecture (loud and prolonged applause).

PLATE I.

(Adapted from diagram shewn at Mr. Preece's R.I. Lecture).

(Preece's system).

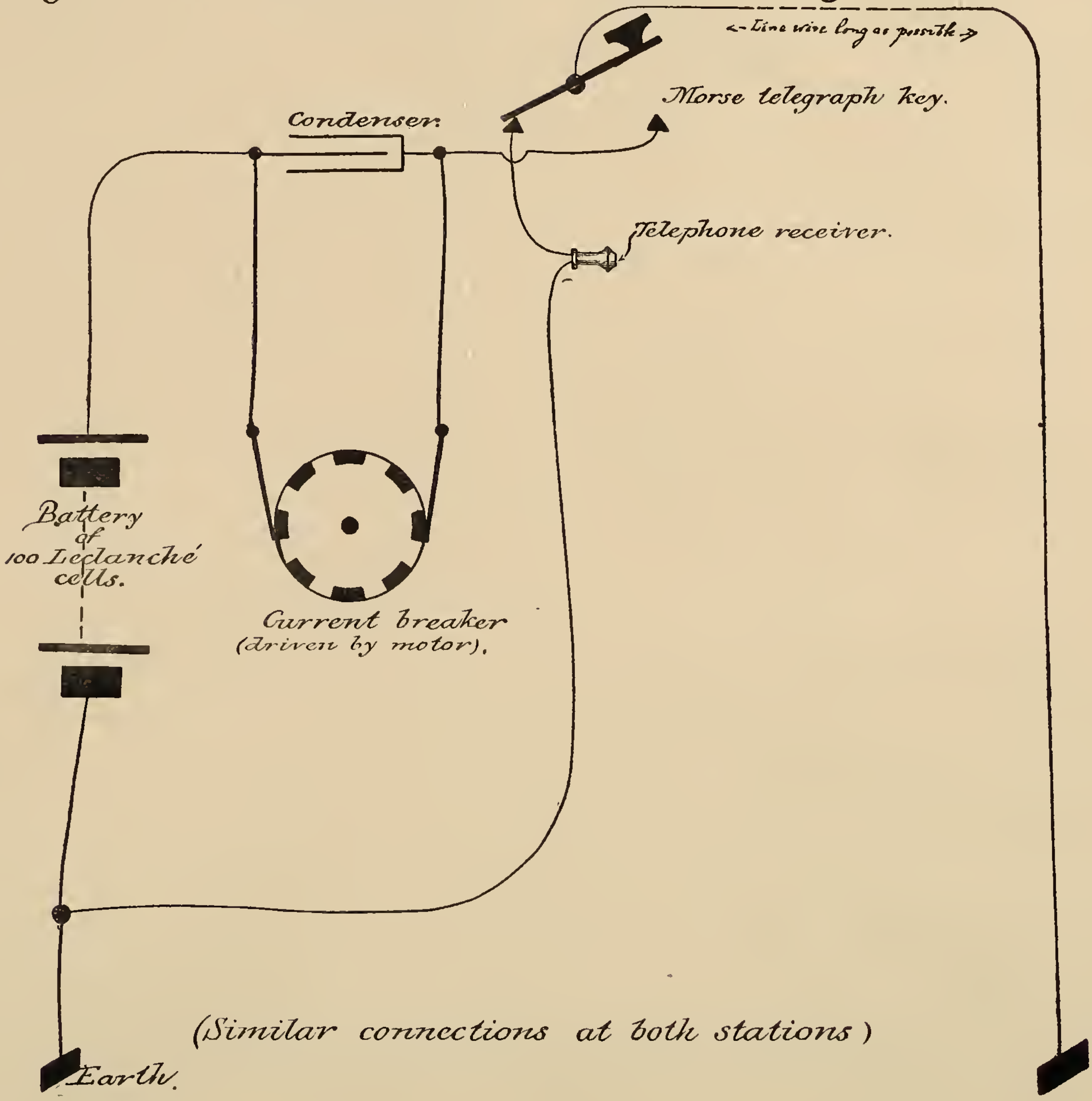


ions at both stations)

PLATE I.

(Adapted from diagram shewn at Mr. Preece's R.I. Lecture).

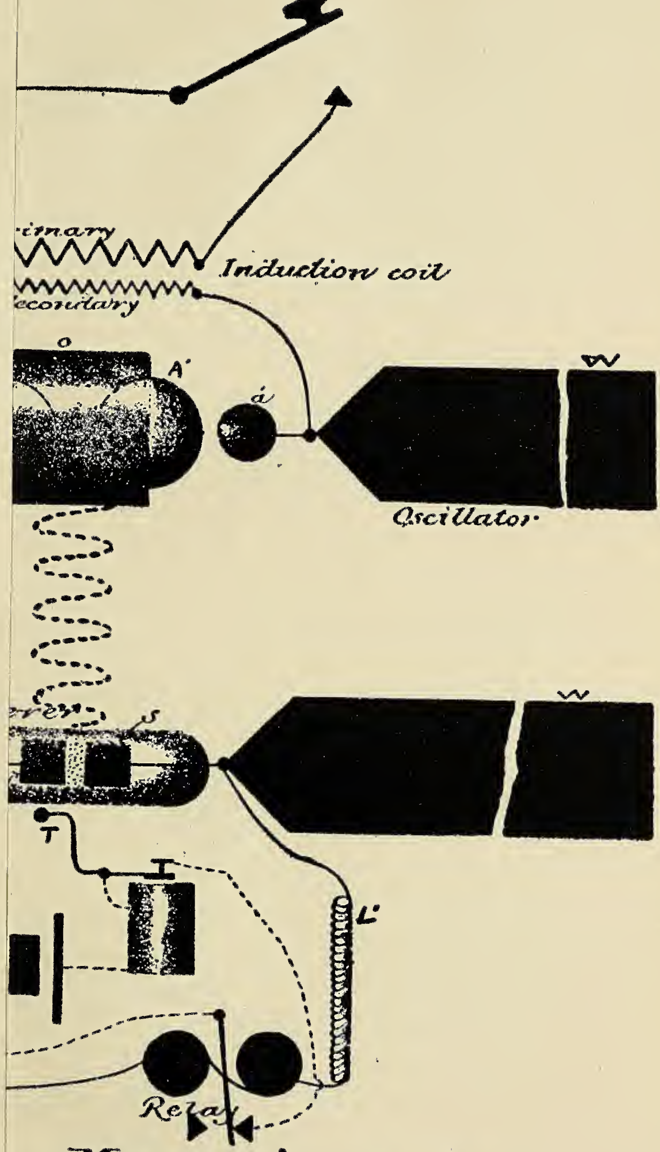
Diagram of connections. (Preece's system).


← Line wire long as possible →
Morse telegraph key.
Condenser.
Telephone receiver.
Battery of 100 Leclanché cells.
Current breaker (driven by motor).
Earth.

(Similar connections at both stations)

PLATE II.

(Diagram shewn at Mr. Preece's R.I. Lecture).



Marconi's system.

PLATE II.

(Diagram shewn at Mr. Preece's R.I. Lecture).

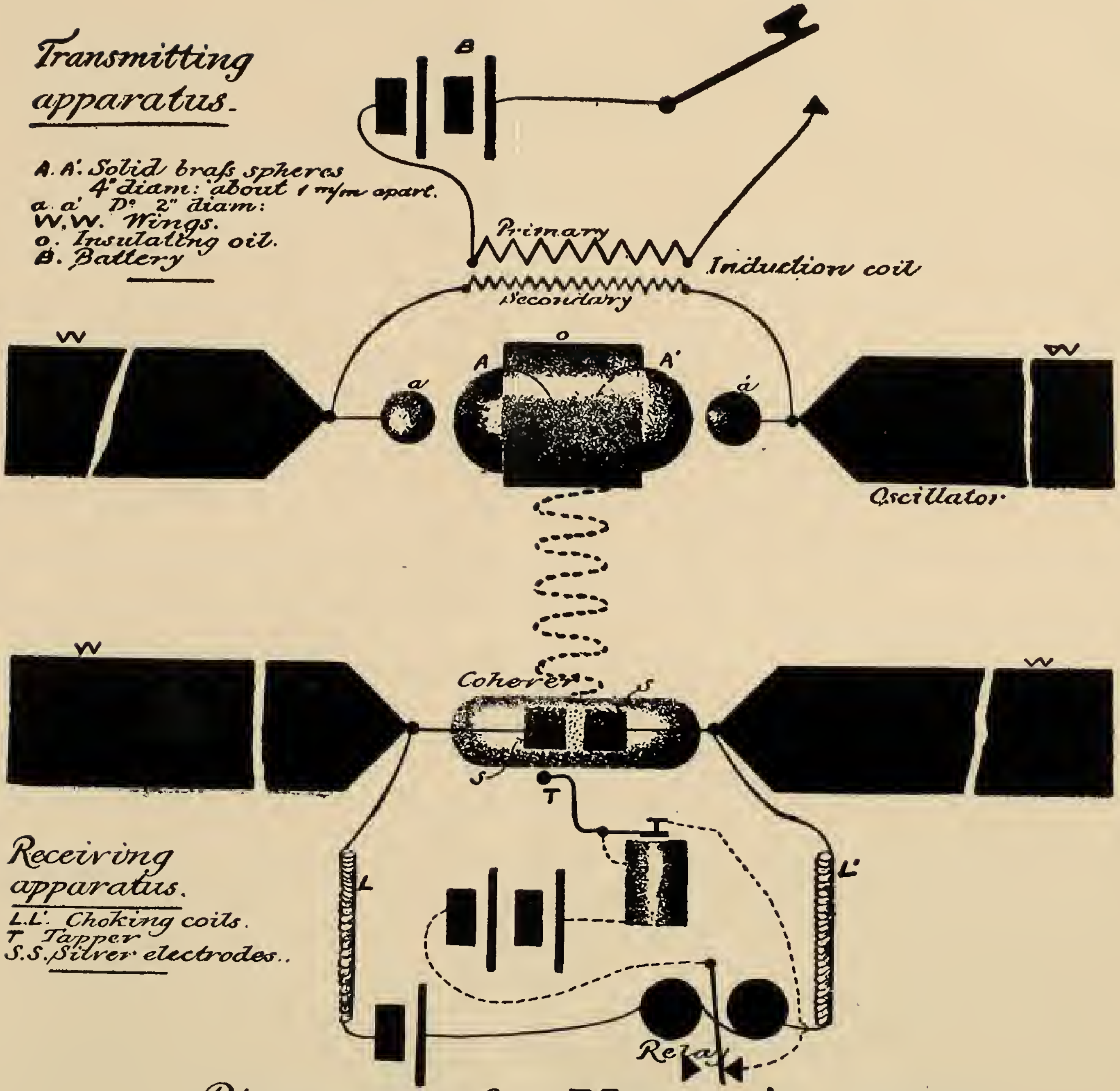
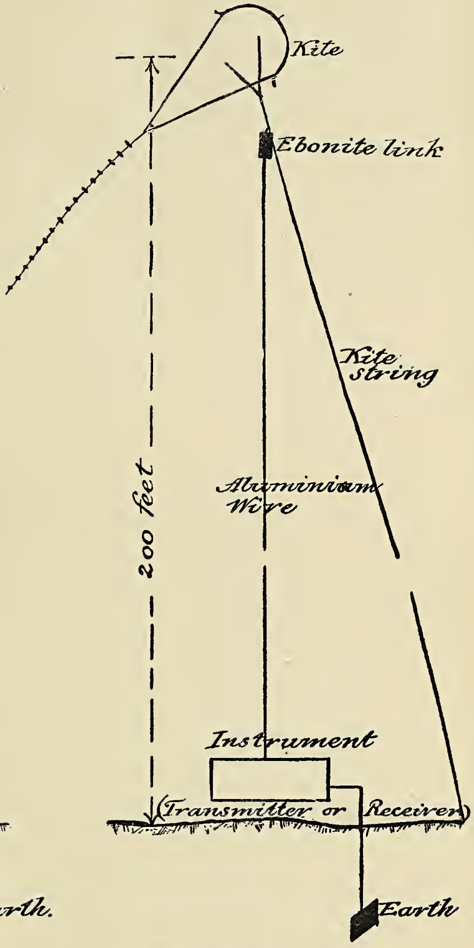


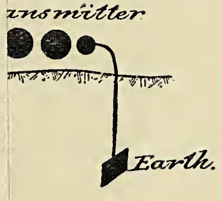
Diagram of Marconi's system.

PLATE III.

(From R.E. Journal).



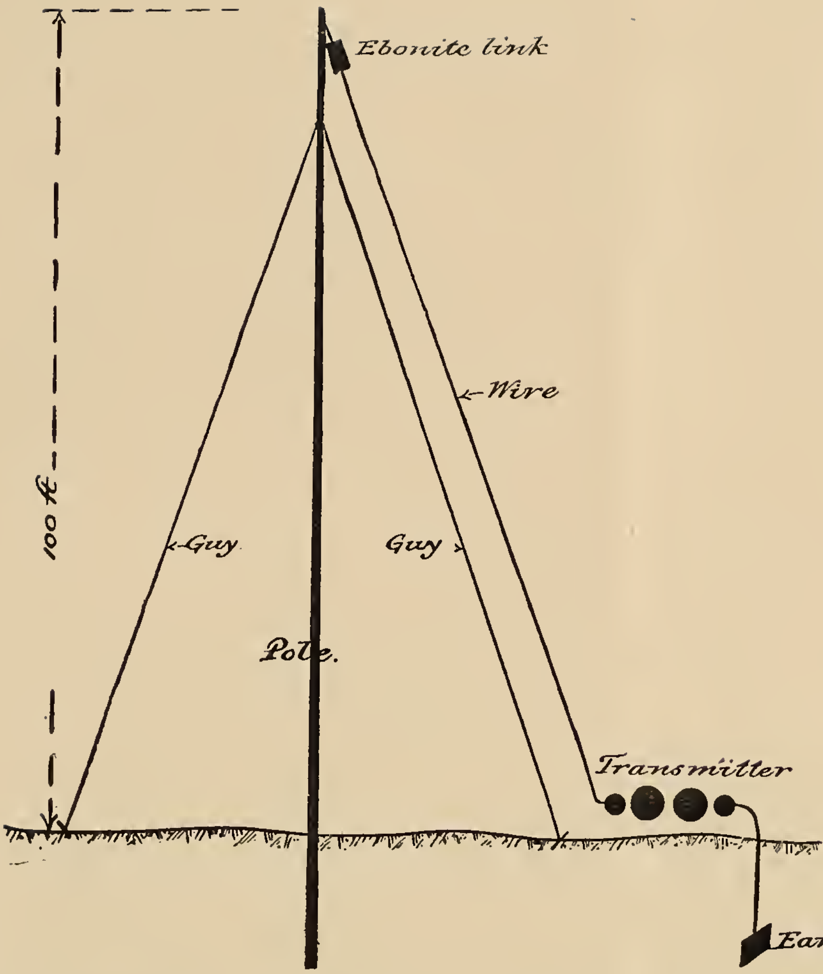
Transmitting up to 9 miles



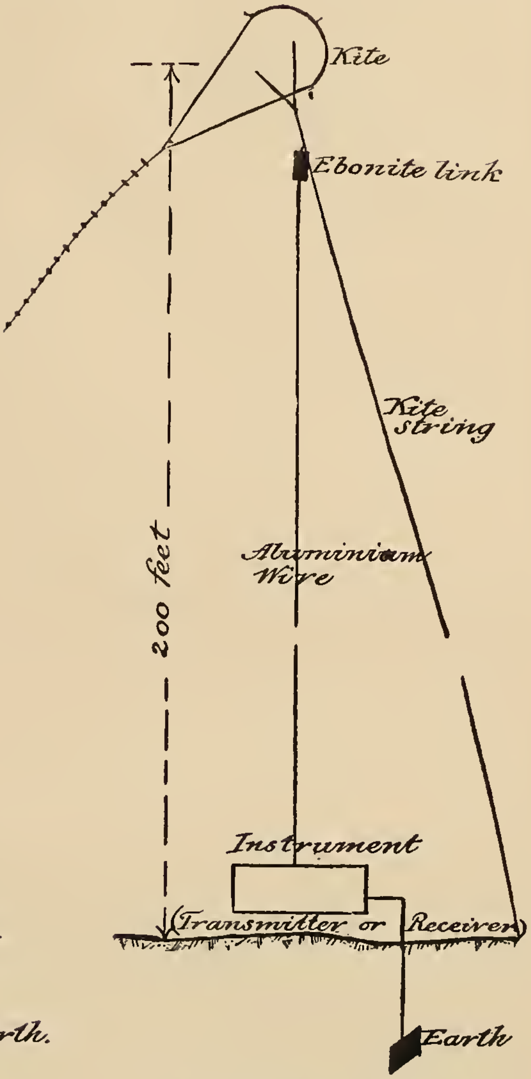
similar:

PLATE III.

(From R.E. Journal).



Transmitting up to 3 miles.
Receiving Instrument exactly similar.



Transmitting up to 9 miles

A SYSTEM OF COMPARING GEOGRAPHICAL DISTANCES.

BY

CAPTAIN F. J. S. CLEEVE, R.A.

(A Lecture delivered at the Royal Artillery Institution, Woolwich, Thursday, 14th Oct., 1897)

MAJOR-GENERAL J. F. MAURICE, C.B., IN THE CHAIR.

CAPTAIN CLEEVE—General Maurice, ladies and gentlemen. As the Royal Geographical Society did me thè honour in the Geographical Journal of September, 1897, to insert a letter bearing on the subject of my proposed discourse, namely, "A System of Comparing Geographical Distances," I must ask the indulgence of any members of the audience to whom it may not represent fresh ground.

In taking as my theme that it is more important to avoid ignorance than to acquire knowledge, I desire to distinguish between a superficial knowledge—which may be extremely accurate or absolutely wide of the mark—and a fundamental knowledge of a permanent though approximate nature, which, it is hoped, may serve as the basis for more detailed investigation of any portions of the subject which may be of interest historically or otherwise.

One is accustomed to see maps of continents on small scales and of islands on large scales, and thus one's ideas of distance are apt to vary according to the size of the country under consideration. A tailor can, from a few salient measurements, realise the exact dimensions involved in the construction of a coat, and thus by remembering the shape of a particular country, and the distance between certain known places or features, an approximate idea may be formed of the distance between any two places whose locality is known, or the extent of any known region therein. By taking a fixed unit of distance and marking merely places to which this unit corresponds, the effort of memory is considerably simplified. I happened to select as the unit, the length of the British Islands, namely, from Land's End to the Shetlands, which is 750 miles, and have been extremely surprised at the remarkable number of important distances to which this unit corresponds. I have found similar results unattainable with any other standard of measurement. It appears to represent the natural extent of most of the homogeneous countries, and of a great many geographical features, as well as the distances at which rival centres of government or important towns have sprung into existence. My lecture being a reiteration of examples of this unit, it will not, I fear, be possible to introduce any great variety into it, and it may thus prove somewhat a tax on your patience which I must ask you to excuse.

EUROPE.

Geographical Features.

My standard, as I said, is the distance from the Land's End to the Shetlands, 750 miles. The maximum length of the Caspian Sea is 750 miles. It will be observed that the shape of the Caspian Sea is very much that of a foot-print and that its breadth is about a quarter of its length, and may be taken roughly as 200 miles. The length of the Caucasus is 750 miles. It will be observed that about 350 miles of its length lies along the coast of the Black Sea, and consequently that the distance between the Black Sea and the Caspian is about 400 miles; this also represents roughly the length of the Russian railway from Batoum to Baku. The length of the Black Sea is 750 miles; the breadth of the Black Sea is, approximately, half its length, and it will be noticed that the distance from Constantinople to the Crimea is about 350 miles. As you know, our sick and wounded were sent back from the Crimea to Scutari, and the length of the voyage may thus be remembered. The distance from Varna to the Crimea is about 300 miles; that is the distance through which we shifted our base in 1854.

The next five distances may be considered as the base on which the map of Europe is built up, as in a triangulation for a military survey.

From the Black Sea to the Baltic is 750 miles; from the Baltic to the Adriatic is the same. It will be observed here that about half of this unit is in German territory and the other half in Austrian, and that the point at which the line crosses the frontier is the south of Silesia where it was expected that the Prussian armies would break through in 1866. From the north of the Adriatic to Cape Matapan in the south of Greece is rather over 750 miles. It will be observed here that rather less than half of this distance represents Austrian coast frontier and that the remainder, 400 miles, is practically equally divided between Greece and Turkey, the west coast frontier of each of which is about 200 miles. From Cape Matapan to the mouth of the Danube, is 750 miles. About half of this unit lies in the Ægean Sea, and the remainder represents the distance from the mouth of the Danube in Turkey to the Ægean. The cross measurement is also 750 miles. Here it will be observed that the Iron Gate, where the Danube enters its fourth basin, is about 350 miles from the sea, and that consequently the southern frontier of Roumania and the northern frontier of Bulgaria are that length. From the shape of Bulgaria you will be able to estimate the fact that from the Danube to the Balkans is about 70 miles. It will also be observed that these five measurements which I have just given form a diamond of two equilateral triangles. From the Adriatic to the Bay of Biscay (the mouth of the Adour) is 750 miles. Here it will be seen that about 450 miles of this distance (roughly) passes through French territory, and that the north of Italy is about 300 miles across. If one looks at the shape of the north of Italy, which represents in fact the battlefields of Italy, one will see that its breadth is rather more than a third of its length, that is to say, rather over 100 miles, and therefore that from the Alps to the Po is, roughly, 60 to 70 miles. From the Straits of Dover to Cape Finisterre is 750 miles—this will be remembered principally by those who, like myself, have the misfortune to be bad sailors. The length of the Baltic from Memel, where the previous measurement was taken, to Tornea is 750 miles, and from the Shetlands to the north of Iceland, not absolutely the northern point, is the same. The Mediterranean divides itself into three units:—

(1.) From the coast of Syria to Cape Matapan—this is the portion of the Mediterranean which is principally identified with ancient history, namely, with the Dynasties of the Egyptians, the Assyrians, the Persians and the ancient Greeks. Towards the fall of the supremacy of classical Greece we find the Greeks gradually extending into the next unit, their operations in Sicily being the cause, in fact, of the fall of Athens as a power.

(2.) The next Mediterranean unit is from Cape Matapan to Cape Spartivento, the southern point of Sardinia. This is identified with the general rise of the Roman Republic up to the second Punic war, when the existence of the Roman Republic was so seriously threatened and when the third unit in the Mediterranean came into play, namely—

(3.) From Cape Spartivento to Gibraltar—this third unit is also 750 miles.

During the time of the Roman Empire the Mediterranean was, of course, a Roman lake.

Countries.

Taking the length of various countries in Europe, the length of Spain and Portugal from Cape Creux to Cape St. Vincent is 750 miles. It will be observed that the northern frontier of Spain is rather less, approximately 600 miles, and also that the coast line is about 350 miles, and the length of the Pyrenees about 250 miles, also that Portugal may be roughly taken as 400 miles long and 100 miles across. Madrid, it will be seen, stands opposite the centre of the unit, and is from 200 to 300 miles from the coast and from the Pyrenees.

The length of France and Switzerland is 750 miles, hence you will observe that any measurements in France must necessarily be less than 750 miles. You will see that the southern coast of France, as the crow flies, is very much the same length as the Pyrenees, that is to say rather over 250 miles. The western coast of France is about equal to the northern coast allowing for the indentations, and by comparing it with the standard distance, may be taken at about 400 miles. The eastern frontier is roughly about 600 miles and divides itself into four almost equal portions: Belgium, Germany, Switzerland, which is very much indented, and Italy, which is also considerably indented. The length of Germany again, from Memel to Treves, is 750 miles. Berlin you will see stands about in the centre of Germany, consequently the distance from Berlin to the French frontier is about 350 miles, and the distance from Paris to the German frontier is about 200 miles. The frontier was altered to the extent of about 50 miles after the last war, consequently, before the war, Berlin was about 300 miles from the frontier and Paris 250 miles. With reference to this distance of 250 miles, taking 10 miles as an average day's march for a large army, you will see that it represents 25 marches, that is to say about a month's march, allowing for halts. When the German armies had proceeded about half way, they moved to the northward for one week's march to Sedan without getting any nearer to Paris, and from Sedan they proceeded to Paris. Hence by the route they took, the length of the journey was about five weeks; as a matter of fact it took them about six weeks, viz., from the 4th of August to the 19th of September. In other words the resistance of the French armies delayed them but little more than a week.

The length of Austria is 750 miles. The frontiers of Austria divide themselves into seven approximately equal portions, each of about 400 miles—that is to say, the North German frontier, the Russian frontier, the Roumanian frontier, the Servian and Montenegrin frontier, the coast frontier of Austria, the Italian and Swiss frontier, which is very much indented, and the South German frontier.

The length of Italy and Sicily is 750 miles. The main breadth of the peninsula is about 100 miles and the Adriatic somewhat more.

Turkey including Roumania is also 750 miles, and before Bosnia was annexed by Austria the length of Turkey from Constantinople to the north of Bosnia was 750 miles. Sweden again is approximately 750 miles.

With regard to Russia, the central point of Russia in Europe is Moscow. From Moscow to the mouth of the river Mezen in the North Sea is 750 miles. From Moscow to Warsaw, the principal place in connection with any operations westward, is 750 miles; from Moscow to Orenburg, the high road to the Khanates is 750 miles. From Moscow to Odessa, in connection with any operations southward is 750 miles. This may be remembered in connection with the Russian reinforcement of their troops in the Crimea.

With regard to other smaller countries in Europe, it will be seen that the following countries are of very much the same size: Belgium, Holland, Sardinia, Sicily and the Crimea; that each portion of Greece is also about that size, and that Greece and Denmark are of similar dimensions.

DISTANCES BETWEEN CAPITAL TOWNS.

From London to Christiania is 750 miles; from Christiania to St. Petersburg is approximately the same, also the following: from London to Madrid approximately; from London to Florence, from London to Venice, from London to Vienna, from Vienna to Constantiople (hence from London to Constantinople is two units or about 1500 miles), from Vienna to Stockholm, from Rome to Berlin, from Rome to Brussels, from Copenhagen to Dublin, from Copenhagen to St. Petersburg, from Moscow to Stockholm. You will observe from St. Petersburg to Dublin *via* Copenhagen is approximately the same distance as from London to St. Petersburg *viâ* Christiania.

ASIA.

The same unit of 750 miles applies to the following: the length of the Red Sea, two units, viz., Suez to Jeddah, Jeddah to Aden, the cross measurement from Jeddah across Arabia to the Persian Gulf, one unit, from the Persian Gulf to the Mediterranean, one unit also, from the Caspian Sea, to the Straits of Ormuz; from the Caspian to Kandahar; from Krasnavodsk, a Russian port on the Caspian to Samarkand. From Orenburg, which we noticed just now, to Rawal Pindi is about 1500 miles, and Tashkend, an important military station in central Asia, is rather more than half-way as the crow flies (probably rather less than half-way so far as the actual distance that would have to be traversed). The western frontier of India stretches from Karachi to Attock or about Rawal Pindi, length one unit. This boundary divides itself naturally into three parts, namely, Karachi to Sukkur, Sukkur to Dera Ghazee Khan and so to Rawal Pindi. In the lower portion all frontier difficulties were settled in the one word *"peccavi."* The next portion from Sukkur to Dera Ghazee Khan is the portion that naturally abuts on Kandahar, and the upper portion from Dera Ghazee Khan to Rawal Pindi represents the portion that is watched by the Punjab frontier force, and which is at the present moment of importance, especially the upper 150 miles of it. Sukkur to our frontier beyond Quetta is also about 250 miles and the northern portion above Rawal Pindi recently brought under our influence, to Baroghil Pass is another 250 miles. From Rawal Pindi to Allahabad—the central station for troops in the lower provinces is 750 miles; from Allahabad to Manipur, the most distant place from which troops might be brought, is 750 miles.

The west coast of India consists of two units, viz., from Karachi to Goa and from Goa to Point de Galle. The eastern coast of India consists also of two units, from Point de Galle to Masulipatam, where the coast makes an angle, and from Masulipatam to the mouths of the Ganges, Calcutta—the north and south length of Burmah is approximately 750 miles. From Calcutta to the spot where the French, English and Chinese empires meet is rather over 750 miles—from that point to Hong Kong is approximately 750 miles; from Rangoon to Hué, our own principle sea-port and that of the French in their possessions, is 750 miles.

With reference to these measurements the following points appear to me to be of interest. From the outlying portions of Russia in Finland and Poland to bring troops to Moscow represents one unit; to place them and the Muscovite in Asiatic Russia, at Orenburg, represents another unit; to place them at the head-quarters of the army of the Khanates represents another unit. From there to our own frontier place d'armes (Rawal Pindi) is another unit. For the movement of troops in the south of Russia, knowing the length of the Caucasus to be 750 miles, we observe that one unit places them on the Caspian, 200 miles by sea places them at Krasnovodsk; another unit places them at Samarkand, or as the crow flies, at Kandahar. With reference to our own possessions, one unit moves troops from Karachi to Rawal Pindi, another unit from Allahabad to Rawal Pindi; a third unit, as I think I explained before, would bring them in from Manipur and outlying parts to Allahabad. From Bombay to Allahabad is practically another unit. The breadth of India at Bombay is almost one unit. As regards the sea journey you will remember that from the Straits of Dover to Cape Finisterre is one unit; the Mediterranean represents two complete units to the south of Cape Matapan, and the remaining portions, viz., from that point to Port Said, and from Cape Finisterre to the Straits of Gibraltar, and from London to the Straits of Dover may be taken as, roughly, a unit and a half. Hence from London to Port Said is about four and a half units. The remainder of the journey by the Red Sea is, two units in the Red Sea and about two and a half units in the Indian Ocean—that is to say also four and a half units—the total distance nine units. Taking the route by Brindisi; from London to Venice is one unit; the length of the Adriatic Sea a little off the south coast of Greece is another unit; and the distance to Port Said is rather less than a third unit. Hence the total distance is slightly less than three units; that is to say there is a saving of about one and a half units, and the further advantage that rather more than half of it is a land journey. Assuming a railway to be made in the Euphrates Valley; if such railway came from Beyrout, this portion of the distance to India would be one unit to the Persian Gulf, one unit approximately to the south east of Persia, and half a unit to Karachi; that is to say, two and half units instead of four and a half units—there would thus be a saving of two units and the total viâ Brindisi would be five and a half units. If this railway were made to fit in with the Constantinople and European railway system, the distance would be approximately, Constantinople to the Persian Gulf, two units; hence Constantinople to Karachi would be three and a half units; now London to Constantinople is two units, hence the total distance would be five and a half units. I should previously have mentioned that the western frontier of Afghanistan and Beluchistan, that is to say the distance from Herat to the sea, is approximately one unit, and that the breadth of Persia is also one unit.

Further, going back to ancient history, you may observe that when the children of Israel were taken captive to Babylon the distance involved was approximately one unit. Also that the Anabasis of Xenophon's army from Ephesus, as the crow flies is about two units to Cunaxa, where the decisive battle was fought, actually it was considerably more, owing to the sinuous character of the route. From Cunaxa the celebrated retreat of the ten thousand covered, as the crow flies, roughly, one unit to Trebizond, but in fact it was rather longer than the Anabasis, and was carried out in the middle of winter.

Alexander the Great moved first of all from Greece across the Hellespont into Asia Minor, fought the battle of the Granicus, went down to the south of Asia Minor back to Gordium, where the Gordian knot was cut, then came round to Tyre, which he besieged, having won the battle of the Issus en route; from Tyre he went into Egypt, where he founded the city of Alexandria, wandered about in Libya and returned to Tyre—the distance, as the crow flies, would be about three units. From Tyre he proceeded eastwards, won the battle of Arbela, and thence to Babylon; this distance was approximately another unit, that is to say, four units. He then moved down to Persepolis, about half a unit, say four and a half units; from Persepolis he went viâ Ecbatana to the south of the Caspian, which you see is another unit, making five and a half units. From south of the Caspian he went on to Kandahar or probably Quetta, where a Greek statue was discovered in 1887 (I happened to be quartered there at the time), another unit, making six and a half units. From Kandahar he moved northward to about Tashkend, another unit, making seven and a half. From Tashkend, he invaded India, another unit, eight and a half. From the north of India from Attock, he moved by the Sutlej to Karachi, another unit, making nine and a half units. From Karachi he went back to Babylon, two units, giving a total of eleven and a half units, as the crow flies. At Babylon he died. The total time taken in these movements was about eleven years.

Hannibal's principal campaign was from Saguntum to the Alps, as the crow flies about 500 miles. Having crossed the Alps he fought the battle of the Ticinus and of the Trebbia, in the north of Italy; then he moved southwards and fought the battle of Lake Thrasymenus. Then the battle of Cannæ, and finally he went into the south of Italy to Capua, where he went into winter quarters, the total distance involved being about two units. This occupied about three years. He spent another ten years in Italy before he was recalled to Carthage.

In comparing these exploits with modern times we find that Napoleon's Expedition to Russia in 1812, represented two units: one unit in friendly territory across Germany and one unit in Russia, thus half was through hostile territory. The difficulties of the winter were probably rather greater than those of Xenophon in the Retreat of the Ten Thousand, although very deep snow and frost-bites were experienced in both cases.

To continue my distances in the east of Asia. From Hong Kong, which practically represents Canton, to the mouth of the Yang-tse-kiang, in the neighbourhood of which stands Shanghai, is one unit; from there to the Gulf of Pechili and Moukden is also one unit. Thus from Canton to the northernmost part of the seat of the last war, is the same distance as from the north of the Mezen in the White Sea to Odessa. From Nagasaki to the Gulf of Pechili is also one unit; this represents the distance at which the Japanese fleets were working away from home waters. The length of Niphon the principal island in Japan, is also one unit.

AFRICA.

The coast of Algeria is one unit. The coast of Morocco one unit: from the north of Tunis to the Cameroons, at which the coast makes a bend to the southward, is three units. The mean breadth of the Sahara may be taken as one unit, though in many places it is rather more. The inhabited region in the south of this portion of Africa has also a mean breadth of about one unit. From Kumasi to Timbuctoo, that is to say, from the French centre of influence to our own, is one unit; from Sierra Leone to Kumasi one unit; from Kumasi to the Cameroons one unit. With reference to this region and the general state of the country, I may quote the reply of the Board School boy when he was asked what he knew about the west of Africa,—he said that "the west of Africa was extremely prosperous and quite uninhabited until that wicked Mr. Stanley came and filled it full of towns and villages." From the Cameroons to the mouth of the Congo is one unit; the length of Angola (Portuguese West Africa), one unit; the length of German West Africa (Damaraland and Namaqualand), one unit. The extent of Cape Colony is about half a unit from north to south; the northern measurement of Cape Colony and also distance from Capetown to Natal (as the crows flies), is about one unit; the length of the Transvaal and of the Orange River Free State is rather less than one unit; this is the portion of Africa with which we were principally concerned until about 15 years ago. Taking the portion of Africa that is now springing into importance we observe that from Natal to Beira, whence the new railway into Mashonaland is being built, is one unit; to the mouth of the Zambesi is about 150 to 200 miles; from the mouth of the Zambesi to the Victoria Falls is one unit. From the Victoria Falls springs several distances of interest. From the Zambesi to the Orange River, that is to say from the Victoria Falls to Kimberley, one unit: from Victoria Falls to Walfish Bay, an English Port standing in German territory, one unit. You will thus observe that the diameter of Africa along the line of the Zambesi is about two units, and along the Orange River is rather more than one unit. From Capetown to Mafeking which stands opposite to Pretoria is one unit; from Mafeking to Salisbury, to which the Capetown-Mafeking railway will be run, is rather less than one unit; also from Mafeking to Walfish Bay is about one unit. From the south of Madagascar to

Delagoa Bay one unit; from the north of Madagascar to Zanzibar one unit, and the distance from Mauritius to the north of Madagascar one unit. The length of Madagascar is about a thousand miles, that is to say, very much the length of France and Spain together, and the Mosambique channel, as it is called, is, at its narrowest portion 250 miles broad, very different from a channel as we understand it in England. From Victoria Falls to the south of Lake Tanganyika is 750 miles. This gives an approximate idea of the dimensions of British Central Africa. To continue the coast measurements; from Beira and Sofala Bay to the north of Portuguese territory (Cape Delgado) is one unit; from Cape Delgado to the north coast line of British Uganda one unit; from this point as the crow flies, to Zeylah rather more than one unit; from Zeylah to the White Nile one unit. The length of the Nile, as the crow flies, comprises about three units: from Cairo to Dongola one unit and two units to the south of the Victoria Nyanza. German East Africa is also about one unit in length from north to south.

To recapitulate the general measurements of Africa, you will see it comprises three units from the north of Tunis to the Cameroons; three and a half units more to Capetown, rather over two units from the Cameroons to the extreme west, three units along the Mediterranean on the north, two units along the Red Sea, and four and a half units more on the east coast. The cross measurements are one unit on the Orange River, two units on the Zambesi and three units on the Equator.

AMERICA.

From Mount Hecla in Iceland to Cape Farewell in Greenland is one unit. From Cape Farewell in Greenland to Resolution Island on the mouth of the Hudson Straits one unit; also from Cape Farewell to the Straits of Belle Isle on the coast of Labrador one unit. Hence the distance from the old world to the new may be remembered, roughly, as three units. You will remember that from Iceland to the Shetlands is one unit. The distance from London to New York by the ordinary trade route is about four units. The length of Labrador is one unit; from the Straits of Belle Isle to Quebec one unit. Montreal is about 200 miles further up, from Montreal to Chicago one unit. From Chicago spring a number of important distances. From Chicago to the Gulf of Mexico, or rather more properly from the south of Lake Michigan to the Gulf of Mexico, is 750 miles; from Chicago to Charleston, from Chicago to New York, from Chicago to the south of Lake Winnipeg, from Lake Winnipeg to the rocky mountains, are all 750 miles. The length of Hudson's Bay is one unit approximately, also the breadth of Alaska approximately. This may be remembered in connection with the distance of the Yukon River from the coast. In Mexico from the Rio Grande del Norte to the south-westernmost point of the coast is 750 miles, also from Cape Catoche across the Gulf of Mexico; the length of Cuba where the insurrection now is;

from New York to Charleston and the length of Lower California are each one unit.

In South America I may mention first of all that the extent of Brazil is roughly about twice that of European Russia, and the remaining countries with the exception of the Argentine Republic, which is of considerable extent, generally contain one measurement of 750 miles, but not necessarily the maximum measurement. You will thus from their shape observe that they are larger than the European countries, in which 750 miles generally represents the maximum measurement. Colombia, Ecuador, north of Peru, Bolivia, from Buenos Ayres to Valparaiso, all measure 750 miles. The three Guianas measure rather less than 750 miles and Venezuela rather more. Hence from the distances I have given this evening I think one can form some idea of what the rectification of the frontier ought to be for the purposes of this lecture (laughter).

AUSTRALIA.

The mean breadth of Queensland east to west is one unit, of New South Wales one unit. The coast line of New South Wales one unit, not quite as the crow flies. The mean breadth of South Australia one unit, Western Australia is slightly more.

In conclusion I may add that the printed slips showing the distances—which have been distributed this evening—are designed to enable one to grasp the general proportions of the countries under consideration, and, just as a military reconnaissance sketch can be developed from a field-book, to enable one mentally to reconstruct these countries. I have found it of assistance to lay out the distances given with strips of wood of equal length, for example lucifer-matches, each of which may be regarded as the unit of 750 miles. I will give you an instance on the blackboard, by drawing India, of how this may be done. I mark out from Karachi to Goa; from Goa to Point de Galle; from Point de Galle to Masulipatam; from Masulipatam to the mouth of the Ganges (*drawing the same on the blackboard*). This represents the western frontier of India—Rawul Pindi and roughly Allahabad—Manipur—The general run of the coast line will be *this:* Ceylon—east coast—From Bombay across India is 750 miles. *There* would be Calcutta, from Surat to the Himalayas *there;* Bombay to Allahabad or rather to Lucknow; then the general run of the Himalayas would be *so (drawing the same). Here* of course would be Karachi; *here* would be Allahabad, and *there* north of Manipur; south of Burmah would be somewhere *here; that* if you can see it shows how a certain general idea of the Indian frontier may be grasped.

As it has been necessary for me throughout to keep my eyes fixed on the map, my dissertations have necessarily been of an extempore character, I must therefore apologise for tautology and want of symmetry which a written lecture might have enabled me to avoid. Finally, I beg to thank you for the patience with which you have favoured me. (Loud applause).

THE CHAIRMAN : Well, gentlemen, as nobody has anything to say I will offer our very hearty thanks to Captain Cleeve for what we have all found to be an extremely interesting lecture, and I think I may say (unless my impressions were different from those of the rest of you) a very much more interesting lecture than we expected when we came into the room. It has been a most agreeable surprise, and we have had many valuable suggestions from the lecture. I therefore beg to thank him very heartily in your name (loud applause).

SUMMARY OF DISTANCES.

Standard—Land's End to Shetland Islands, distance 750 *miles.*

Europe.

Geographical Features.

Length of Black sea (maximum).
,, Caucasus.
,, Caspian sea (maximum).
Length of Mediterranean—
  East coast of Mediterranean to Cape Matapan.
  Cape Matapan (Greece) to Cape Spartivento.
  Cape Spartivento (Sardinia) to Gibraltar.
  Adriatic to Bay of Biscay (Trieste to Bayonne).
Cape Finisterre to Straits of Dover.
Shetland islands to North cape (Iceland).
North to south length of Baltic (Tornea to Memel).
*Black sea to Baltic (Memel).
*Baltic to Adriatic (Memel to Trieste).
*Trieste to Cape Matapan.
*Cape Matapan to mouth of Danube.
*Mouth of Danube to Trieste.

* N.B.—These form a diamond of two equilateral triangles.

Countries.

Length of Spain and Portugal (Cape St. Vincent to Cape Creux).
Length of Switzerland and France.
,, Italy and Sicily.
,, Austria (east and west).
,, Germany (Memel to Treves).
Length of Turkey (Bosphorus to North-West Bosnia) and South-West to North Roumania.
Length of British Isles (Land's End to Shetlands).

Distances between Capital Towns.

London to Christiania.
,, Madrid (approximate).
,, Florence.
,, Venice.
,, Vienna, Vienna to Constantinople; hence London to Constantinople, 1500 miles.
Vienna to Stockholm.
Rome to Berlin.
,, Brussels.
Copenhagen to Dublin.
Copenhagen to St. Petersburg.
Moscow to Stockholm.
,, Odessa, Moscow to mouth of river Mezen (North sea); north and south length of Russia = 1500 miles.
Moscow to Orenburg, Moscow to Warsaw—east and west breadth of Russia in Europe = 1500 miles.
Moscow to Warsaw, Warsaw to Rheims—Napoleon's expedition, 1812.

Asia.

Suez to Jeddah, Jeddah to Aden; (length of Red Sea 1,500 miles).

Breadth of Arabia—Jeddah to Persian gulf.

Persian gulf to Mediterranean.

Caspian to Mediterranean.

Caspian to Straits of Ormuz (entrance to Persian gulf.

Caspian to Kandahar

East to west breadth of Persia (to head of Persian gulf).

Eastern frontier of Persia.

North to south length of Afghanistan and Baluchistan.

Orenburg to Tashkend (approx) } 1500
Tashkend to Rawal Pindi ,, } miles

Eastern frontier of India—Rawal Pindi to Allahabad, Allahabad to Manipur.

Length of Western frontier of India.

West coast of India—Karachi to Goa, Goa to Point de Galle (total 1500 miles)

Eastern coast of India—
Point de Galle to Masulipatam.
Masulipatam to Mountain of Hoogli.

Surat to Himalayas.

Bombay to Lucknow or Allahabad (approx.)

Bombay to bay of Bengal (east to west).

Calcutta to river Yang-tse-kiang.

Calcutta to Chinese frontier (east to west), Chinese frontier (as above) to Hong Kong—Calcutta to Hong Kong 1500 miles.

North to south length of Burmah.

Bay of Bengal to gulf of Tonquin (through Aracan)—also Rangoon to Hué.

Cochin China to Phillipine isles (east to west.

Canton to mouth of Yang-tse-kiang (Shanghai).

Ningpo to Pechili.

Pechili to Japan.

Length of Niphon (Japan).

Africa.

Gibraltar to Madeira.

Coast of Algeria.

Coast of Morocco.

South to east and south to west length of Morocco.

Mean breadth of Sahara desert (north to south).

Length of Guinea (north to south).

Coast of Angola and Benguela.

Length of Namaqualand, north to south

Cape Town to Natal (straight line).

Length of Cape Colony (north frontier line).

Length of South African Republic and Orange River Free State.

North Madagascar to Mauritius.

North Madagascar to Zanzibar.

South Madagascar to Delagoa bay.

Ulundi to mouth of Zambesi.

Mouth of Zambesi to Victoria falls.

Sierre Leone to St. Jago (Cape de Verde islands).

Timbuctoo to Kumasi.

Sierra Leone to Kumasi.

Kumasi to Cameroons.

Cameroons to mouth of river Congo.

North to south length of Congo State (mean).

Victoria falls to Tanganyika.

Victoria falls to Walfish bay.

Victoria falls to Kimberley (Orange river).

Kimberley to Walfish bay.

Cape Town to Mafeking.

Cairo to Dongola.

East-west breadth of Egypt (at Wady Halfa).

White Nile to Zeylah (east to west).

Northern boundary of Somaliland.

Zeylah to north-coast boundary Uganda.

North-coast boundary Uganda to Cape Delgado.

Cape Delgado to Beira.

America.

Mount Hecla (Iceland) to Cape Farewell (Greenland).
Cape Farewell to Resolution island (Hudson straits).
Cape Farewell to Cape Charles (South Labrador).
East to west breadth of Greenland (through Jacobshavn).
Length of coast-line of Labrador.
Mouth of St. Lawrence to Quebec.
North to south length of Hudson bay to Cape Wolstenholme.
Chicago to south of Hudson bay.
,, Montreal.
,, New York.
,, Charlestown.
New York to Charleston.
South of Lake Winnipeg to Rocky mountains.
South of Lake Winnipeg to south of Hudson bay.
South of Lake Winnipeg to Chicago.
Bermuda to Cape Hatteras.
Cape Hatteras to South Florida.
Mean north to west breadth of Alaska.
Length of California.
,, Cuba.
East to west breadth ef Ecuador.
,, ,, Peru.
,, ,, Bolivia.
,, ,, Colombia.

Australia.

Mean breadth of Queensland (east to west).
Mean breadth of New South Wales.
Mean breadth of South Australia.
Coast-line of New South Wales.

Reproduced by kind permission from *Geographical Journal* of September, 1897.

OUTPOSTS FOR COAST DEFENCE.

BY

MAJOR R. M. B. F. KELLY, R.A.

I THINK a very little consideration will show that the efficiency of Coast Defence depends as much upon its being at all times ready for action at very short notice, as upon any other factor that goes to make up that efficiency. The experience of the Coast Gunner is likely to be that of long periods of inaction, followed by sudden and unexpected attacks—and possibly an attack at the very outbreak of hostilities without any warning whatever.

Such conditions are very trying to the defence, which will require to have a very good organisation to prevent its vigilance being impaired.

Coast defence per man is, I suppose, the most costly arm of the service. Speaking generally, this expense has been incurred to afford secure harbours to our navy and to protect our naval dockyards and, to a lesser extent, our more important commercial harbours. If a single torpedo boat eludes the vigilance of the defence, the expense has, to a greater or less extent, been incurred in vain—not only on account of the loss inflicted by that boat, but by giving rise to an idea of want of vigilance, and by the stimulating effect of success on the enemy, encouraging him to make further attacks and thus destroying the confidence the navy had in the Coast Defence, and depriving them of the needful rest which they require when in harbour.

Thus vigilance will not only help to repel an attack, but will tend to discourage its being made or repeated.

To ensure this vigilance and readiness, the organisation of the defence must provide for the earliest possible information as to the movements of ships, whether hostile or friendly, affecting any particular fortress—for a sharp lookout seawards; means of discriminating between friend and foe; the presence on the spot of an officer able to take instant action; and for a sufficient number of men and guns being kept ready to give immediate effect to his orders—further, the organisation must be such that the tax on the garrison will not be excessive, and it must have been so carefully worked out and tested beforehand, that it can be applied at the very outset of hostilities; it will not do to leave the consideration of such an important matter till then, and no mere paper scheme is worth the paper it is written on until it has been tested.

Practically, what is wanted is a system of outposts for Coast Defence Artillery, and, to use an old-fashioned term, both inlying and outlying pickets are necessary. Inlying pickets represented by a system of watch or look-out at the forts themselves, and outlying pickets represented by a number of observation posts along the coast. I think it is the case in most coast fortresses that the allotted garrison is only strong enough to furnish one relief for the manning detail, and, I presume, it may be taken for granted that the whole strength cannot be kept constantly ready for action by day and night throughout a war, which may last for months. It follows from this, that security against surprise can only be obtained by dividing the detail into reliefs or watches, a watch being always on duty and relieved at regular intervals. Certain guns should be told off for emergency use, and these should, in most cases, be kept loaded and run up and be fought by the relief on duty until the reliefs or watches off duty had assembled and reinforced them.

As this would take place within a short time of the alarm being given, and as, in the meantime, the ammunition could be taken from the recesses on the gun floor, it would not be necessary for the relief to find any ammunition detail, nor even full detachments, so that if an ordinary manning detail found three watches, all the more important guns could be fought, till the full manning detail had assembled and the fort was fully manned. The arrangement of the reliefs would require some little care so as to cause as little confusion as possible when the relief on duty was reinforced by those off duty, and the manning changed, from the manning by relief, to full manning.

Each relief should contain a proportion of specialists, and if possible ⅓rd (with three reliefs) of the detachment of each gun manned by the relief should be included in each relief and form part of the detachment found by the relief for that gun. The relief or watch on duty would be on the same footing as a guard or picket, and would only have to keep a small number of men actually on the alert who might be relieved every one or two hours. The number of these "sentries" would vary, of course, in each fort, but should generally include: an officer and signal man on look-out, a range taker, telephone operator, one or more orderlies and, perhaps, one man per gun or group manned; at night, probably a lamp trimmer would be required.

A regular log should be kept by the officer on look-out, assisted by his signal man, in which should be entered the description, and if possible, name, of every vessel sighted, and all warnings received.

A warning should be sent to all interior forts—*i.e.*, forts higher up the anchorage, channel or estuary—of all vessels inward bound passing an outer fort and going in the direction of such forts. A note should be made against the entries of warnings received, when the vessels concerned were identified. As it is almost as important not to mistake a friend as to recognise a foe, these warnings should be sent for both friendly and hostile vessels. It would not be necessary to send warnings about outward bound vessels, but the passage of all men-of-war going out, should be recorded, so as to have a record of what vessels were out, as an aid to the identification of vessels passing. The system I have briefly sketched would ensure a certain number of guns being brought into action at very short notice; it provides for the transmission of warnings to interior forts, and for a look-out being kept, this would ensure notice of an approaching ship from the time she could be sighted from an outlying fort. The time for preparation this amount of notice would give, would be a varying quantity: depending on time of year, time of day, weather, position of fort and speed of ship. The interior forts would probably get ample warning from the forts below, but should not on that account dispense with their own look-out. At an outlying fort the officer on look-out, would have in the short time available from the ship being first sighted, to decide—

(1) Whether it was friend or foe,
(2) Whether to open fire,
(3) How to attack, and—
(4) He would have to acquaint his own B.C. and the F.C.

As very often the time from the ship being seen from the fort would not be enough for all this, an additional advanced post, as it were, is necessary, and this is afforded by the examination anchorage, which would very likely be about 1000 to 3000 yards outside the outermost fort, or one of the outer forts.

The examining officer would, in most cases, be able to inform the fort whether the ship was friend or foe before the officer on look-out could decide it for himself, and in the case of a foe, would signal the alarm when she crossed the examining line, which, in many cases, would be before she could be clearly seen from the fort, but this would not diminish the necessity for a look-out at the fort, as the examination anchorage might be evaded or rushed, or the examining officer deceived as to the character of the ship, so that the system of examining shipping may be said to be an assistance to the defence, but not to relieve it of responsibility.

The duties of the officer on look-out should be very clearly defined; he should be trained in identifying ships and should have an assistant, whom I have called a signal man, also trained in this duty. The officer should be empowered, without reference to higher authority, to fire a shot across the bows of any doubtful ship and to attack her if she did not heave to. Also to attack at once any vessel known to be hostile or signalled as such, if she was trying to run past, or was at close or medium range.

The officer on look-out, or the senior officer of the watch or relief (if at the B.C. post), would be considered in command of the fort until relieved by the regular B.C. A watch should also be posted in the F.C.'s station consisting of one or more telephone operators, observers, orderlies and trumpeters, under an officer who would represent the F.C. during his absence and summon him if necessary. In case of an action being commenced at one fort, he would acquaint all the other B.C's. That some such system is necessary, and that the initiative may often have to be taken by a junior officer is, I think, evident, if it is admitted that an attack or attempt to run past may take place (almost without warning) at any hour. Fire and Battery Commanders cannot always be at their posts and there should be some machinery for carrying on during their absence, and the system should be tested and rehearsed in peace time.

The best number of reliefs, whether two or three, and the best system of dividing any given manning detail as to these reliefs, will depend very much on the nature of the work, the accommodation of the manning detail and whether it is composed of R.A., Militia or Volunteers. The object to be kept in view in each case, is to make the transition from manning by relief to full manning as simple as possible while preserving the administrative units as intact as possible. I referred above to a signalman, who was to assist the officer on look-out; the rank is not officially recognised, although the duties are:—The signalman should be the B.C.'s. right hand man, he should have exceptional qualifications and be in receipt of exceptionally good pay for his special duties. He should be a semaphore signaller, understand the international code system, and be a telephonist as well. He should be quick at recognising ships and be acquainted with their leading characteristics.

The officer on lookout duty should be in possession of all the memoranda for the day, i. e. secret signals, a list of our men of war expected to leave or enter the port and any intelligence as to hostile movements that the F.C. may think fit to give him. He would take over from the officer he relieved, the log-book with all warnings sent or received as to the movements of ships.

For the transmission of warnings to interior forts, direct communication is necessary; in many fortresses, communication from one fort to another is through an exchange at head-quarters, but this route would not be good enough for warnings as the line from either of the forts to the exchange might be occupied with a message to or from head-quarters. To give the telephone operators power to send warnings, "X.X.B." would be to give them the power to prevent the G.O.C. from sending orders to the forts, or to delay these orders which might be dangerous. The only way out of the difficulty (where there are a series of forts along an anchorage or estuary) is to have a line going direct from fort to fort, along which lines warning signals would always have priority.

The best arrangement for the transmission of warnings from farther afield than the limits of vision from the outermost fort of any particular fortress is a more difficult question. There is no doubt that in former times the system of beacon fires enabled the news of a hostile attack, or the presence of a hostile fleet, being passed rapidly over the country and that with all our improved means of communication, we have no organised system to replace the effective if somewhat primitive system that was used in troublous times before. On the other hand it seems doubtful whether it would be worth the expense to establish a system of out-look posts all round the coast, as a hostile fleet or ships would keep out of sight of land till just off the place meant to be attacked. Still there are certain points which a hostile squadron would find difficult to evade *e.g.* Dover, and others in which out-look stations could with advantage be placed outside the outermost fort and whence an observer could send timely notice.

Coast guard stations already exist at most of such coigns of vantage and although in time of war, the coastguardsmen would probably be afloat, the buildings could be occupied by trained landsmen.

Again, Lloyds' signalling stations could be used to signal the passage and approach of friendly and hostile ships, and if these notices were passed direct to the forts, the danger of firing on friendly ships would be much diminished. Lighthouses and ships from their position, have unrivalled opportunities of seeing passing ships, but their use for the purpose of conveying intelligence of hostile movements might be an infringement of international law. It would certainly appear desirable that certain selected posts should be used for the transmission of warnings; that these posts should be connected by wire to the nearest fortress, and that a certain number of men should be trained in peace time to observe and signal passing ships, to replace the coastguard in time of war. These posts would also be posts of communication with our own fleet by means of which they could make known their wants with less loss of time than that involved in going into port, and by means of which they could transmit any warnings as to hostile movements, it might be desirable to send.

2

PRÉCIS
AND
TRANSLATION.

MILITARY CYCLISM.

TRANSLATED FROM THE FRENCH.

BY

F.E.B.L.

MILITARY cyclists have covered themselves with glory in the recent manœuvres in Normandy, near Arras and St. Quentin. Surprises of dragoons riding trustfully along, skirmishes with advance guards, carrying off patrols and the defenders of isolated posts, all in the very face of General Billot, who wondered much at it all.

The same feats, recorded last year in the manœuvres at Charentes, are being now reproduced by another cyclist company of the 11th division, "the Iron Division."

Who would have suspected a few years ago the part, always on the increase, which this steel toy, the bicycle, would be called upon to play in the army, perhaps to revolutionize tactics as it has modified manners and customs.

There was much laughter when the Italians first employed the steel horse in 1875 at the manœuvres at the camp of Somma. But in those days there was nothing to be had but a lofty bone-shaker. 10 years afterwards Austria followed suit, followed by her faithful ally, Germany. France and Russia had not yet mounted their tandem.

Cycling clubs were the initiators of the movement in France. A trial was made in 1886 when the clubs were invited to place eight cyclists at the disposal of the general commanding an army-corps. Their services were such that General Cornat said at the close of the manœuvres that he preferred cyclists to optic telegraphy up to 12 kilometres and to cavalry at all times. Military cyclism was thus established: in 1889 the principles of its organisation were laid down, and in 1891 M. de Freycinet, then war minister, invited all the army corps chiefs to report to him as to the services that might be rendered in a campaign by military cyclists. These reports were so favourable that a commission, presided over by General de Boisdeffre, decided on appointing 3000 of them, divided into regimental and staff cyclists. The bicycle was also pressed into the service of bridges, telegraphy, and balloons.

There were of course many detractors, but their objections fell to the ground when it was seen with what rapidity and efficiency cyclists carried out a thousand difficult services, which had up to then rendered indispensable numerous cavalry soldiers on the staff of an army corps.

Those keen cyclists, however, who were not satisfied with the humble posts of messengers and carriers of letters and orders, insisted that the bicycle was and must be made a fighting machine.

The outcome of this view of the matter is the folding bicycle of Captain Gérard of the 87th regiment. It can be carried, when folded, in the hand or on the back. Its wheels are smaller than those of ordinary rear-driving ones (probably about 2ft. in diameter, the same as the front wheel of a Bantam) and the saddle is placed vertically above the axis of the hind wheel, generally rather low, so that the rider may stand over it when firing.

The tube connecting the saddle and the bracket is curved round the back wheel, and there is but one tube connecting the curved tube to the post. This connecting tube is in two parts which are hinged and covered by a small overlapping tube provided with a handle, and clamped by three independent rings, there being a tool supplied for the purpose to avoid the use of the eternal screw spanner. Special braces are supplied to which the folded bicycle is attached, and the machine is said to be lighter than a knapsack.

The introduction of this bicycle has led to the framing of the following formula or principle:—"The machine should be carried in all cases where it is unable to carry its rider."

50 seconds are sufficient time for the folding of the Gérard machine, and rather less for putting it together again. It is perhaps needless to point out that a bicycle is a much smaller object than a horse and therefore less liable to be hit; moreover when wounded the machine is more easily and infinitely more quickly repaired. It requires no forage and no water, only a few drops of oil, but these are now all acquired facts, mere trite truisms. In the night bicycles move with less noise than either horse or foot, but they must be very liable to accidents when circumstances forbid them the use of their lamps.

All their advantages were well shown by Captain Richard of the 87th with a company trained by himself for the manœuvres of a brigade last year at St. Quentin. At first the company, small enough for mobility but large enough not to be stopped by a few patrols, started, not on the road towards the enemy, but making a long détour, felt for the enemy on his flank; observed, then hurried to another point with rapid pedals and re-appeared, harassing and surprising the bewildered enemy who was unable to discover the strength of the forces opposed to him, the weakness of the cycle contingent being masked by the use of smokeless powder. Meanwhile the little company intercepted couriers, took prisoners, alarmed villages, and generally spread havoc and demoralisation through the ranks of its foe.

Another important use to which this cyclist company was put was that of cavalry support. They acquitted themselves of this duty in such a manner as to astound every one, following or preceding cavalry at every pace, supporting it by their fire at the decisive moment, stopping the advance of the hostile cavalry and discovering even the position of the enemy's infantry.

Napoleon requisitioned country carts and waggons to carry his Imperial Guard from the camp at Boulogne to the banks of the Rhine on their way to his triumph at Austerlitz. Just fancy how much easier that job would have been done with folding bicycles!

All the foregoing is a short précis from an article by M. Georges Dubosc in the *Journal de Rouen*, 12th Sept. It would have been interesting to have had exact weights and measurements of Captain Gérard's bicycle. It may be inferred from the faulty mechanical construction which has been forced upon him as it were by the necessities of the folding adaptation, that the tubes are of great strength and of corresponding increased weight. On the other hand the smaller wheels are lighter than ordinary bicycle wheels, but they are much more difficult to drive through mud than the latter, as anyone knows who has driven a Bantam and also a rear-driver. The saddle of Captain Gérard's bicycle is not well placed for the exertion of a man's full power; it is too far behind the axis of the pedal cranks. Taking all these points together it is probable that the folding bicycle is inferior to the diamond-framed safety, so far as pace is concerned. I noticed when in Normandy a few days ago that Frenchmen generally ride rather higher-geared bicycles than we do. I cannot believe high-gearing to be good in any case for a military machine, and I am convinced such a machine should be provided with a stiff metal gear case. Such a contrivance would also be of advan-

/157C

tage when a machine was folded up.

The following regulations in regard to military cyclists in France is taken from a most amusing book, the *Paris-Vélo Almanach de 1896* :—

The conditions to fulfil for service as military cyclist were laid down in the order of 2nd April, 1892.

The essential points of this order, as recently modified, are :—

Art 15.—Every year, before the 1st of June, commanders of army corps name the time of examination to which all candidates for employment as cyclist must be subjected.

Art. 16.—Men of the active army in their last year of service and men in the reserve and territorial army are eligible.

Men of the active army will be examined in their own corps; those of the reserve and territorial army in a corps of their own arm situated in the same subdivision as their residence, or failing that, in the infantry regiment of that subdivision.

Art 17.—The trial will begin with a medical examination, which determined, the accepted candidate will be given a certain course to run by the results of which he will be classified.

Art. 18.—The medical examination carried out by a regimental surgeon, is to be directed specially to the soundness of the organs of respiration and circulation; varicose veins, hernia and indifferent sight, are to be causes for rejection.

Art. 19.—A candidate will receive credit for any prizes he may have won at cycle races, provided he produce documentary evidence thereof.

The Board will satisfy themselves that the candidate can take to pieces and put together again his machine.

Art. 20.—The course will be determined by the General Commanding the army corps and will be accurately measured.

Men of the reserve and of the territorial army will furnish their own machine which must be a rear-driving safety; men of the active army may make use of the regulation machines.

The course is to be 90 kilometres in less than six hours for cavalry cyclists; or 58 kilometres in less than four hours for infantry.

In reality these rules are not adhered to very closely, and the examination varies according to the post the cyclist is to occupy.

The reserve and territorial cyclists who will be attached to the service of fortified places, are subjected to a very simple test, mount and dismount from their machine, a few turning exercises, a course of 1500 metres in less than four minutes, that's about all.

Those who wish to serve on the staff have to do 50 kilometres in less than five hours, a very difficult task in this sense that it is generally carried out in a hilly region and upon a course which includes a considerable length of cobble stones.

As for the machine the soldier supplies it and keeps it in order at his own expense. As company cyclist he receives 25 centimes a day, on the staff 50 centimes, and as attaché of a general the ordinary pay of a soldier of the first class plus 50 centimes.

Regimental cyclists may use the regimental cycles furnished by the Government if they prefer them.

It is probable that an entirely new set of regulations has now been formulated to govern the conditions of service of the men with the folded cycles. I met half a brigade in the manœuvres when bicycling recently from Dieppe to Rouen and back. Their regimental cyclists all had ordinary machines. The half brigade was manœuvering in the neighbourhood of Tôtes, and on my return in the afternoon to Dieppe I found them all billetted there. Tôtes is about half way between Rouen and Dieppe.

APR 23 1898
U.S. PATENT OFFICE

THE SERVICES
OF
LIEUT.-COLONEL FRANCIS DOWNMAN, R.A.,
IN
FRANCE, NORTH AMERICA, AND THE WEST INDIES BETWEEN THE YEARS 1758 AND 1784.

EDITED BY

COLONEL F. A. WHINYATES, *late* R.H.A.

Part II—Chapter I. *Continued.*

The expedition to Chesapeake Bay. The army lands at the head of Elk River. Marches towards Philadelphia. Battle of Brandywine. Entrance into Philadelphia. Captain Downman takes the frigate Delaware.

August 24th, 1777—This morning about 9, the signal was made from the Admiral to draw provisions, so that we shall land to-day most likely. We were informed to-day that during the Admiral's reconnoitring yesterday he saw 400 rebel horse up the Susquehanna. The army under General Howe, Chesapeake Bay, Turkey Point, August 24th, was composed of:—

	Hessians.
British Artillery ... 700	Linsing Grenadiers
2 Battalions of Grenadiers	Minigerode ,,
2 ,, Light Infantry	Lengereke ,,
2 ,, Guards	Loos ,,

Regiments.

4th, 17th, 37th, 46th, 5th,	du Corps. Donop.
23rd, 40th, 49th, 10th, 27th,	Mirbach. Chasseurs.
42nd, 55th, 15th, 33rd, 44th,	1st Battn. Anspach.
64th; 74th, 16th Lt. Drag'ns	Jägers. Pioneers.

August 25th.—This morning early the grenadiers and light infantry got into the flat boats, proceeded up the Elk river, and landed at the ferry without opposition. I was ordered on board the *Unity*, which weighed anchor and sailed up the river. About noon we came to anchor, and the different brigades of artillery landed as fast as they could. Part of the army were advanced about five miles into the country; the rest were posted along the hills near the water-side. The whole lay under arms all night, which proved a very bad one. I am posted with four 3 pounders with the 71st regiment.

August 26th,—The army keep their ground. The artillery are landing their stores, etc. This night was exceedingly bad. The army still untented.

August 27th.—The army still on their first ground. We are informed that Washington's army is strongly intrenched on Brandywine heights. I received orders about noon to-day to quit my 3 pounders, and take command of the 2nd brigade of heavy artillery, consisting of two medium 12 pounders, two light 12 pounders, and two 5½ inch howitzers, with their waggons, and to march directly. I set off about 3 o'clock following the 1st brigade. We went about five miles and lay under arms all night. The country is beautiful, not many houses, but the ground that is cultivated seems to be in good order and yielding corn plentifully. We have met with no enemy as yet, nor any friends. The country is quite deserted. Cattle and other things have been met with and found very acceptable. General Howe has given strict orders against any kind of marauding, but it is not in anyone's power to prevent this where there is so large an army and such a mixture of troops. The Hessians are famous and infamous for their plundering.

August 28th,—This morning about 4 o'clock the Hessian grenadiers began to move from their ground, and I followed them. We continued our march till about 1 o'clock, when we came to Head of Elk, about 12 miles, a most fatiguing march, the roads exceedingly bad, horses very bad, and the sun intensely hot, with nothing to eat or drink but apples and water. This is the county town, and there are several very good brick houses, but the inhabitants are all fled except a Mr. Alexander at whose house our General resides. The grenadiers and light infantry are advanced a few miles. I was informed by a sick man who ventured to stay in his house, that General Washington dined here the day before yesterday, and had with him 500 light horse, and that this morning a party of the rebels left the town just before we entered it. The rebel army are a few miles from us at Iron Hill or thereabout. The light infantry, in taking possession of a hill about a mile off, exchanged a few shot with some rebel light horse. The artillery are formed into a park at the back of the town, and ourselves and men are encamped. It seems we are to remain here a few days to recruit our horses and put everything in proper order and then proceed to Philadelphia.

August 29th.—We remain on our ground without molestation. The weather intensely hot.

August 30th.—This morning a small party of dragoons, mounted and dismounted, went out with General Howe reconnoitring; soon after their departure we heard several shots fired in a wood a mile from the town. They saw some rebel light horse. Sent a letter to Colonel James through Montresor.

August 31st.—A strong detachment under General Cornwallis marched out this morning to destroy a small magazine. They met with some rebels, whom they drove off. The 23rd regiment had a man killed and four or five wounded, the light dragoons had a man killed and three wounded. Several of the inhabitants have come into the town. General Howe has issued a proclamation promising pardon and protection to all who will accept of it It is said by some deserters that Washinton with 7,000 men is at Iron Hill about four miles from us. Two soldiers of the 71st regiment were found a little way from the camp with their throats cut. It is supposed they were plundering and were set upon by some lurking rebels. Three grenadiers were taken also by the rebels, and four or five artillerymen are missing, supposed to be taken, or deserted.

September 1st, 1777.—Two men of the artillery went off last night. There has been some skirmishing this morning. Two rebel officers and three men taken and one killed, without any loss on our side.

September 2nd.—This day, about 12 o'clock, the two heavy brigades of artillery struck tents and marched from the Head of Elk about a mile and a half, and then encamped with the Hessian grenadiers. We are informed that Lord Stirling[1] is at Iron Hill with a strong party of rebels.

---

[1] William Alexander known as Lord Stirling, was born at New York in 1726, the son of James Alexander, an engineer officer in the army of the Pretender. He served as private secretary on the staff of General Shirley in America and with him was present at the greater part of the war against the French. When Shirley was summoned to England in 1756, young Alexander accompanied him. During the five years he was in England he prosecuted his claim to the Earldom of Stirling, (as heir male to the 5th Earl, who died without issue) on grounds of descent from John Alexander uncle of the 1st Earl. His claim was admitted by a jury in Scotland, but was disallowed by the House of Lords because he failed to show that heirs in the direct line were extinct. Before this decision was arrived at, he had returned to America and adopted the title which he retained to the end of his life. At the outbreak of the war of Independence, in 1775, he sided with the Colonists, served through the war and was made a Major-General. He was an excellent officer. Previous to his visit to England in 1756, he married Sarah Livingston, sister of Governor Livingston of New Jersey, and had two daughters. He died January 15th, 1783.

A few words may be added about the 1st Earl, the poet (1580–1640), the friend and pet of Kings James I., and Charles I. who created him,

Lord Alexander of Tullibrodie.
Viscount of Canada.
Viscount and Earl of Stirling.
Earl of Dovan.

With these titles he received the following gifts, by charter or letters patent, in the New World.—

(1.) Nova Scotia.
(2.) Canada including 60 leagues of bounds on both sides of the St. Lawrence River, and the Great Lakes.
(3.) A 'Tract' of Maine and the Island of Stirling (Long Island) and the Islands adjacent.

The "Tract of Maine" embraced all east of the Kennibec River to Nova Scotia and included Newfoundland. It was a prodigious gift.

He had also given him the power to create one hundred and fifty "Baronets of Nova Scotia," nearly fifty of which titles exist to the present day. An interesting memoir of the Earl of Stirling, (from which these particulars are taken), has been published by Ludwig Schumacher. New York, 1897.

September 3rd.—This morning at 5 o'clock we began our march towards Iron Hill. The grenadiers, light infantry, jägers and Queen's rangers[1] in front, the heavy artillery following the Hessian grenadiers. After marching a little way, a smart firing began in our front. The rebels fired as usual from the fences and trees. It was briskly returned on our side and they were pursued for some time. The army went about six miles and encamped at the foot of Iron Hill. The guards and 27th regiment are in possession of the summit. On our march we saw a number of the rebels killed; the wounded were either carried off or crawled into the bushes for none were to be seen. Between 40 and 50 of the rebels were buried by our pioneers, and it is imagined many more are killed in the woods. I saw in a field a corporal and five men lying near together, killed by grape shot. Five others bearing captains' commissions and a field officer, were carried to the General. A General Maxwell commanded the whole here, and it is thought they had upwards of 1,500 men. We had only two or three killed and about twenty wounded. Some deserters came in to-day. They mention Washington's being at Christian's or Brandywine Creek with 13,000 or 15,000 men and a number of cannon, strongly posted. We entered Pennsylvania this day, having passed a large stone that is the boundary mark.

September 4th.—Remain on our ground very quiet. This afternoon I walked up to Iron Hill, and had a view of part of the Delaware river at the distance of about eight miles.

September 7th.—This day about noon the army received orders to be ready to march at an hour's notice. We struck tents immediately and got everything in readiness. Lay under arms all night.

September 8th.—About 4 a.m. the 1st division of the army began their march; the 2nd and 3rd followed according to orders. We went through Newark, a deserted and destroyed village. The front and centre of the army got to the heights of (blank) in the afternoon, but the rear guard to which I belonged, with the 2nd brigade of artillery, did not reach our ground till 11 o'clock at night, after a very disagreeable march of 16 hours without anything to eat, and almost suffocated with dust, owing to the vast train of baggage waggons and cattle that were in front. We did not meet with the smallest interruption in our march from the rebels, for we took a different road to that which they expected, and where they had raised works and collected a force. Mr. Washington is now encamped about three miles from us on a very strong ground with 20,000 men. The Congress is sitting at Philadelphia and have sent positive orders to him to come to action. Our General and other officers are going to reconnoitre with a very strong detachment. In all probability a day or two will decide the fate of America.

September 9th.—About 5 o'clock this afternoon we began to move forward, and made a forced march all night through bad roads. Halted in the morning about 6 at Kennet Square. Skirmishing in front; the rebels have had some loss.

---

[1] Colonel Simcoe's Queen's Ranger Hussars, a corps of Provincial horse.

September 10th.—About 5 o'clock this afternoon moved forward and encamped.

September 11th.—This morning about 6 o'clock the army began to move, one part to the left under General Howe, the other to the right under Knyphausen with intention to divide the enemy's force and to cross the Brandywine Creek at two fords. About 8 or 9 o'clock this morning a very heavy fire began in front, which continued some time between our advanced corps and the rebels, who were posted very strongly in the woods and on the hills facing the ford of the creek. The heavy artillery was ordered to make haste, and we galloped our horses some time, but were prevented from continuing the road by reason of trees being cut down and laid across. We turned into a wood and after a little difficulty got into a road that brought us to a very advantageous situation within shot of the rebel batteries on the other side of the creek. We immediately began to fire upon them from our 12 pounders and howitzers, and they returned it very smartly. This continued for some time, likewise a heavy fire of infantry and artillery in the woods to our right. Presently a total silence ensued. General Knyphausen ordered us to leave off. We began to be uneasy about General Howe, for a great force of the rebels marched from the hills and woods before us towards him, but about noon our doubts were eased, for we heard a firing on our left, at first gentle, but in a little very heavy indeed both of cannon and musketry. About 1 o'clock we saw the rebels running in multitudes out of the woods. We now began again with all our artillery to play on the flying scoundrels; the fire was returned by them from all their batteries. At this very time General Knyphausen ordered the troops under his command to pass the creek, which they did in the face of the enemy's batteries and a heavy fire of musketry. We now saw our brave fellows under Howe push out of the wood after the rebels. We renew our fire from the artillery to scour the woods, they fly from all quarters, and our troops rush on their batteries and take them. By this time it has begun to be dark; a few hours more daylight would have given us a more complete victory. As it is, their loss in killed and wounded is very considerable. We have suffered likewise, but not so much as might be expected from the strength of their situation and their numbers, our loss being about 400 killed and wounded. It is impossible to ascertain how many of the rebels are killed or wounded, but they are to be seen all over the fields and woods; they themselves say 1,000; no doubt it is more. I have heard by some deserters that their army with the militia amounted to upwards of 25,000 men, others say 20,000. We have taken 10 pieces of brass cannon, one iron, and a quantity of ammunition, and about 400 prisoners. We crossed the Brandywine Creek and lay on our arms all night. The deserters inform us that the rebel army is struck with the utmost panic, flying along every road as fast as their legs can carry them, and that the morning after the defeat, 27 waggons of wounded were seen going towards Philadelphia, besides those which are to be seen in almost every house you come to. One officer and 16 men of our artillery were killed and wounded.

September 12th.—This day at 1 o'clock we advanced with the artillery as far as Delworth and there formed a park. A part of the army encamped about us, head quarters being about a mile from us. One part of the army are in possession of Wilmington and another of Chester, two places a few miles from us on the Delaware. Our sick and wounded were sent to Wilmington to be put on board our ships. General Howe returned thanks to the army for their excellent behaviour. A long march of 16 miles, an exceeding hot day, a superior number of troops strongly posted in woods and hills, with a number of cannon, are obstacles which none but British troops can overcome.

The *Roebuck* and a number of our ships arrived at Wilmington in the Delaware river some days ago.

Sent an account thus far to W. Downman.

Bought a horse for two guineas, two dollars.

From the 12th to this day, 16th, we have lain at Delworth without anything of consequence happening. We have been busy in sending off the sick and wounded, and collecting horses to put into the rebel cannon and waggons. This morning early we left Delworth and had a most miserable march to Goshen, where we lay all night. It rained incessantly the whole day and night, and the rebels molested our march by firing on us from woods and fences, but they were driven off as usual with considerable loss. Washington is retiring as fast as we advance. He beats us in running but in nothing else. His whole care and attention is to keep out of our reach and our only wish is to be able to come up with him. Deserters are hourly coming in to us. A rebel general was killed to-day and a good number of men. Our loss hitherto has been inconsiderable.

September 17th.—We again set forward about 10 in the morning through dreadful roads. We had advanced about a mile and a half down a hill, when word was brought that the artillery were in the wrong road. We had to turn about in a narrow road, which took up so much time that we could only get about 300 yards from the place we had left when it became quite dark and rain came on. We were ordered to remain all night.

September 18th.—This morning at three o'clock we began our march towards the Schuylkill in pursuitof Washington; a little popping in the front, some rebels killed. Deserters say Mr. Washington is making off as fast as he can, and that his army is murmuring and dissatisfied. We imagine he is going to Virginia. A French General[1] in the rebel service was drowned in passing the Schuylkill. We took a number of prisoners, among them a Lieut.-Colonel and a Major. We came to Valley Forge in the afternoon and encamped.

September 19th.—We have taken from the rebels a magazine of 5,000 barrels of flour, a quantity of rum, 150 horses, a number of waggons, and other stores in abundance. We are now about three miles from a ford on the Schuylkill, which is only 18 miles from Philadelphia.

---

[1] The Marquis de la Fayette and several other French and Polish noblemen were officers in the American Army, and present at the battle of Brandywine.

September 20th.—The army received orders to march this morning, but these were countermanded on account of the height of the Schuylkill from the late rain. This morning about 12 o'clock a strong detachment from our army, under the command of General Grey, surprised a body of 1,500 or 2,000 rebels who were intending to attack our rear on the march. They were commanded by a General Wane. Between 500 and 600 were put to death on the spot without firing a single shot. The bayonet did the business completely. 160 prisoners were taken. General Grey returned about 1 o'clock in the morning to his camp having lost only one Captain killed and 12 men killed and wounded.

September 21st.—The army marched very quietly over a branch of the Schuylkill near the Forge and store houses called Valley Forge. We lay all night. Some skirmishing in front.

September 22nd.—This afternoon two detachments passed the Schuylkill, the one above, the other below the headquarters at Fat Land ford. They met with hardly any opposition; some artillery was ordered to cover their going over. At six o'clock this afternoon the heavy brigade of artillery was ordered to march towards a ford on the Schuylkill called (blank); the night was very dark. We recrossed the little branch of the Schuylkill at the Forge with great difficulty and lay on our arms till about one o'clock in the morning, fine moonlight, when we again set forward, reaching the banks of the river just as the day began to dawn.

September 23rd.—We passed with the cannon very well, and proceeded to a rising ground where we halted for some time, then again proceeded to Norrington, where we halted for the night. The river at the ford is about three feet deep, very rapid, and about 80 to 100 yards wide. If the rebels had the least spirit or resolution they might have defended this pass; not that they would have prevented our getting over, but they might have killed us a number of men. I believe there is not an army in the universe better disposed or in better order to fight than this one. The rebels fly before us; they run whenever we advance. They say we are mad or drunk or we would never dash in among them as we do. Our light infantry are the finest set of fellows in the world for this mode of fighting.

The country now begins to open out the nearer we get to the metropolis, and there is some variety in the prospect. Cultivation is more perceptible. Hitherto we have seen scarce anything but a continuation of wood, with now and then a small farm house and a field of Indian corn. The army, however, has been well supplied with fresh meat and flour, and abundance of forage for the horses. Very few of the inhabitants have remained in their houses, those who have alone saving their effects. It is otherwise with the deserted houses.

September 24th.—We left Norrington and marched to Germantown without opposition. The Allens met their father and families at this place, all well. We encamped here; a very rainy disagreeable night.

September 25th.—This morning orders were given for six 12 pounders and four howitzers, the British and Hessian grenadiers, and two squadrons of horse to march to Philadelphia. The artillery were in front, the day was very fine, we entered the town with drums and music, the roads and streets were crowded with people who huzzaed and seemed overjoyed to see us. Whether they were pleased or not at our entrance, they must have been struck with the appearance of a body of such fine fellows as the British grenadiers. It was a fine sight.

September 26th.—Early this morning appeared in sight over Gloucester Point below the town, two frigates, five galleys, and a sloop, beating up towards the town. I had the honour to command two 12 pounders and two howitzers. I had everything ready to receive them in a little time. My guns were drawn down on the bank entirely exposed. I received the disagreeable orders not to fire at the ships until they fired at me, which made me extremely uneasy. They came very near us; they still came nearer—within 300 or 400 yards. A shot was fired from one of my guns at them. They hoisted rebel colours, and soon after began to fire. This gave me pleasure for then I could fire with safety. We began a brisk cannonade from all our guns; it was returned by them with both round and grape shot, and their galleys, which were at a greater distance, kept up a fire upon us likewise, and fired many good shots though fortunately they did no harm. One of the frigates called the *Delaware* came within musket shot of our guns, and fired several rounds of grape. We plied her very close and threw her crew into such confusion that they neglected the management of the sails, and after a few more badly directed shot, she ran aground close to our guns. We still kept up the fire, and in a short time she struck her colours. We hailed her and desired her crew to come ashore, which they did, and a party of men was sent on board her. Our fire now was immediately bent upon the other frigate and the row galleys, and our shot was so well plied that they were obliged to to put about and stand down the river very much disabled. It was Commodore Alexander's frigate we took; she mounted twenty-two 12 pounders and six 6-pounders, and had on board 152 men who were all landed given in charge to the Provost; they lost but very few people and we not one. One of the galleys was obliged to run ashore on the Jersey side to prevent her from sinking. The frigate was set on fire during the action by our shots, but happily we soon put it out. The same afternoon a number of rebel sailors entered voluntarily on board of her to fight on our side. Strange work! She was very soon got off into the channel and made ready for action. We expect every hour to be at it again, for there are no less than 13 row galleys and other vessels to the tune of 26, about eight miles below us, and as soon as our ships can pass the obstacles in the river we may expect them up. A great number of the rebel ships are likewise above the town. Sometime in the afternoon a schooner attempted to pass the town downward. In a very few shots we dismasted and so disabled her that she ran ashore just opposite the town, but as we lacked boats to send to her, they carried her away in the night after unloading her. Thus ended the insolent attempt of their boasting Commodore, with two frigates and five galleys, each carrying a 32 or 24 pounder, opposed only by four 12 pounders and two howitzers, three of those being drawn up on the bank without the least covering. We have taken several iron cannon within a few miles from town, 12 and 18 pounders. We proved them; two 18-pounders burst to pieces, but did no damage.

A copy of Captain Downman's report of the action with the frigate *Delaware* being among his papers, it is inserted here :—

To Colonel Pattison,[1]
Commanding R.A.

Sir,—

I have the honour to report that early in the morning of September 26th, two rebel ships, five galleys, and an armed sloop were seen beating up from Gloucester Point to Philadelphia. I commanded at the lower end of the town four medium 12 pounders and two 5½ inch howitzers, and gave directions for everything to be in readiness for action. Captain Standish[2] commanded the same number of guns at the upper part of the town. In the preceding night a platform had been laid for only two of the 12 pounders; the other two and one of the howitzers were therefore placed upon the bank by the water-side as conveniently as the ground would admit. The ships and galleys by this time were approaching very fast. I had received orders not to fire till I was fired at; the situation was disagreeable for the largest ship was within 400 yards, and in another tack or two would have been alongside our guns. She had hoisted before this time rebel colours. A gun was now fired at her, the shot went on board, and we could plainly discover threw the people into confusion. She returned the fire, joined by the other ship and all the galleys. The fire was become general and continued so for some time. The largest ship still seemed inclined to push past our guns, but by receiving some shot, and a shell which set her on fire, the people were thrown into great disorder, neglected the management of the sails, and she ran aground within 250 yards of our guns. In this situation she remained several minutes and fired many rounds. She then struck her colours. Whilst she was aground, Lieutenant Vaughan[3] with two 6 pounders was ordered to a rising ground retired from the water. He fired three shots before she surrendered. A non-commissioned officer was sent to hail her, and order their boat on shore, which command was instantly complied with, and as no artillerymen could possibly be spared from the guns, which were now all turned on the other ship and galleys, ten of the grenadiers were sent on board, and with them went Captain Moncrieffe[1] of the Engineers, by whose activity and cleverness the fire was extinguished. So far from any other soldiers than artillery taking the ship, there was not one man to assist at the guns; many of the townspeople did, and were very serviceable. The ship taken was the *Delaware,* a rebel frigate of twenty-two 12 pounders and 152 men. The other ship carried 20 guns, some of them 18 pounders. The galleys had each an 18 or a 24 pounder.

---

[1] Kane's List, No. 55. Colonel J. Pattison commanded the R.A. during the latter part of the American War. He was appointed Commandant of New York, July 6th, 1779. He died, March 1st, 1805.

[2] Kane's List, No. 233.

[3] Kane's List, No. 415. Lieutenant T. L. Vaughan was killed in the action at Freehold Courthouse, New Jersey, June 28th, 1778.

I have the honor to be, etc., etc., etc.,

FRANCIS DOWNMAN, Captain Royal Artillery.

CHAPTER II.

The attack on Germantown. Preparations to attack the Fort on Mud Island. The rebels attack the battery at Province Island. The attack on Red Bank. News of General Burgoyne.

September 28th, 1777.—General Howe came to town to-day. Lord Cornwallis commands in town. Our chief commands the army encamped. Washington, it seems, is hovering about us, but is afraid to venture near. A great number of the inhabitants have remained in town. I don't know how their hearts are disposed but they carry pleasure in their faces. Mr. Rocher, a clergyman, was taken into custody to-day just as he came out of church; he has been preaching against the King, and influencing the minds of the people for this three years, and this morning had the barefaced impudence to preach for His Majesty. His *finesse* would not do. A great number of the rebels desert to us every day.

From this day to October 3rd nothing very particular has happened. No vessels have attempted to pass the town. Colonel Sterling with his regiment the 42nd, and the 10th, was sent to Chester; from thence he crossed the Delaware with the assistance of our men-of-war, took and destroyed Billingsport, a fort of eight cannon on the Jersey side, and then returned. A good deal of firing from the galleys at our ships that are trying to move the *chevaux-de-frise*[2] sunk in the channel by the rebels. It is reported that Washington is near the town with his whole army, and by intercepted letters we learn he is collecting all his force, with an intention to make an attack on our camp at Germantown.

---

[1] This able officer performed such meritorious services during the war, that it is of interest to give the following particulars. Sir Henry Clinton thus mentions him in connection with the siege of Charlestown, May, 1780:—"But to Major Moncrieffe, the Commanding Engineer, who planned, and, with the assistance of such capable officers under him, conducted the siege with so much judgment, intrepidity, and laborious attention, I wish to render a tribute of the very highest applause and most permanent gratitude; persuaded that far more flattering commendation than I can bestow will not fail to crown such rare merit".

Of this officer it may be remarked, that he was not more happy in the possession of superior talents, than fortunate in occasions to display them. The successive sieges of Savannah [October, 1779] and Charlestown furnished him with opportunities of exemplifying his skill in the two principal branches of his profession; the art of defence and that of attack; in both, his masterly designs were crowned with success; nor is it easy to determine in which of them his great attainments in his profession shone with highest lustre. *Stedman's History of American War,* Vol. II, page 187.

[2] The *chevaux-de-frise* consisted of three rows of immense beams of timber, bolted and fastened together and stuck with spikes. It was sunk across the river a little below the place where the Schuylkill empties itself into the Delaware. The upper line was flanked by a fort on Mud Island and the works at Red Bank; the lower, by works on the Jersey shore at Billing's Port. When the fort was taken; Captain Hammond in the *Roebuck,* made an opening in the lower line. *Stedman,* Vol. I, p. 296.

October 4th, 1777.—In the morning during our march I heard a great deal of firing of cannon near Germantown. I was informed that General Washington with his whole army of 25,000 men had taken advantage of a thick fog, and the supposed absence of a number of our troops, to make an attack upon our advanced body, the 2nd battalion of light troops. They sustained the enemy's whole force for a considerable time till others came to their assistance. The fire then became pretty general and very warm, and continued so for some time. At length the rebels gave way in all quarters in the utmost confusion, leaving behind them a great number of slain and prisoners, five of their generals, 500 slain, buried by us, besides wounded carried off and 500 prisoners. Our loss is not very considerable. General Agnew and Colonel Bird are killed; Colonel Walcot, 5th regiment, is dangerously wounded, and about 350 officers and men killed and wounded, of these 60 killed, and between 300 and 400 wounded. The light 12 pounders and fieldpieces had a share in the day's action, and had several men wounded. Traille[1], Stewart[2] and Huddlestone[3] were with the light 12 pounders. During the engagement in Germantown, Colonel Musgrave had the good fortune to throw his regiment, the 40th, into a large house,[4] from which he did very great execution, notwithstanding the rebels had four pieces of cannon playing upon the house with round and grape shot, making it like a riddle, and he lost but very few men. The rebel army was pursued by some of our troops a good way beyond Chestnut Hill, but they had taken the precaution of having a great number of horses to their guns, by which means they escaped.

October 6th.—The rebels have got about 40 vessels near the *chevaux-de-frise* and have been firing all the afternoon, and till 10 o'clock at night, at the *Roebuck* and other of our ships that are near them. We learn to-day that Lord Howe is arrived in the *Delaware.*

October 7th.—The 8 inch howitzer and mortars are preparing for service; we suppose, to fire on the rebel fleet.

October 8th.—This afternoon at 4 o'clock Captain Standish marched with the 8 inch howitzer, 8 inch mortars, and two medium 12 pounders, escorted by some grenadiers and 10th regiment, down to the ferry near the entrance of the Schuylkill, to destroy the rebel shipping, to endeavour to land on Province Island,[5] and to silence their forts on Mud Island. About 10 o'clock this night we heard a great firing from the rebel fleet, which continued a good while. They were firing at our battery of two 12 pounders on the point of the Schuylkill.

---

[1] Kane's List, No. 221. Captain Peter Traille.

[2] Kane's List, No. 247. Captain John Stewart.

[3] Kane's List, No. 277. Captain W, O. Huddlestone.

[4] Chew's House.

[5] Formed by the junction of the Schuylkill and Delaware rivers about three miles below Philadelphia.

October 9th.—I was ordered to march to the ferry to relieve Captain Standish. I got there in the evening. He had not crossed the river.

October 10th.—I continued in the battery at the entrance of the Schuylkill, the galleys now and then giving us a shot without effect. We are situated in full view of their whole fleet of 30 differently armed vessels at the distance of about a mile. A party of our men with engineers passed the ferry this afternoon, and during the night threw up a battery.

October 11th.—About 1 o'clock this morning Captain Montresor[1] informed me that the battery on Province Island was ready to receive the howitzers and mortars, and desired me to march and cross the ferry directly. I got there about half past 2, and had got an 8 inch howitzer in the flat, but for want of some care the flat went to the bottom in an instant, with several men and horses, and one of each was drowned. This accident prevented our doing anything further for the night. In the fore part of the evening two 12 pounders had been taken over, and one of them dragged up to the battery through a mile of mud and water, for the whole island is a flat, and from rain, and the rebels cutting the embankment, the whole was nearly under the water. The battery is raised within 400 or 500 yards of the fort on Mud Island and open to all the rebel shipping, and their galleys can go within 150 yards of it. About 6 o'clock this morning the rebels discovered our work, and began and continued a constant fire from all their vessels and batteries upon it till about 4 in the afternoon. About 10 in the morning they landed some troops who marched up to the battery, attacked our people and for a little time were in possession of it. Our force on the island at this time was very small, not above 200 men; they were in great danger of being cut off and losing the two 12 pounders. A Major V . . . . commanded; he was hurrying off the island in boats as fast as he could, and had he not been prevented, the island would undoubtedly have been in the possession of the enemy. He was ordered back to support those that remained, and by the activity of Captain Moncrieffe the battery was re-taken, and some soldiers. As it was, the rebels carried off 50 prisoners of the grenadiers and 10th regiment, who, I am sorry to say did not behave as they ought to have done. Four artillerymen were taken, and an ammunition waggon was blown up by a shot. I was relieved by Capt. Standish about 5 this afternoon. In the night one 12 pounder was drawn off the battery and brought near the ferry house. The howitzer that was sunk in the flat was got up again, and the two pieces with the mortars and ammunition waggons all crossed the ferry, and remain there till the battery is ready to receive them.

October 12th.—This morning the rebels began again to fire and kept it up for some time. They have killed and wounded some of ours. They landed a party of men, but they were soon driven off again. The engineers are going to-night to strengthen the battery and raise some works. I rode from town this morning, crossed the ferry and walked to the shore within 400 yards of their floating battery, and returned to town in the evening.

---

[1] Chief Engineer.

October 13th.—This afternoon at 3 o'clock I marched from town with a detachment to relieve Captain Standish on Province Island, crossed the ferry and remained till 12 at night, when the Engineer informed me the battery was ready for the howitzer and mortar. I set off directly across the causeway, but horses and waggons falling over the bridges through the badness of the roads, we did not get to the ferry house, only a mile, till 3 in the morning. It was then thought that daylight would be coming on before the things could be taken to the battery, therefore we remained here all day.

October 14th.—This evening about 10 o'clock I moved from the farm house with an 8 inch mortar and howitzer down to the battery facing the fort on Mud Island, and got them into it after a great deal of difficulty from the shockingness of the road, which is nearly all under water and has many deep holes in it. Everything here is carried on by night, for in the daytime the rebels fire both round and grape shot at anybody they see. This night was very favourable, for the island was covered with a thick fog, and under this cover another battery was begun and finished before daylight, to contain a howitzer and 8 inch mortar, which were also got down and ready to open as soon as the fog cleared up. These two batteries are exactly opposite the fort at the distance of about 600 yards. The batteries are 200 yards apart, but have a safe communication by means of the embankment which serves as a breastwork for the battery guards. The rebel boats were rowing about a good deal in the night, and seem to be preparing for some fun.

October 15th.—The fog did not clear up so that we could distinguish anything plainly till about 8 or 9 o'clock in the morning, when I fired the first howitzer into the fort. The other battery began directly after me, and we kept up the ball for some time without their returning a shot. At length they began and fired very briskly at us, but did no damage. This morning another battery of ours, of two iron 18 pounders, opened upon the rebel shipping and fort; unfortunately one of these guns burst and badly wounded two or three men. This battery was begun and finished in the night; its situation is on the point of Province Island near the Schuylkill, and it is called the Pest-house battery. Immediately after our fire commenced, the whole rebel fleet moved out of reach in great hurry and confusion, receiving some damage from our shells. Their Commodore and large ships went near Gloucester Point, and their floating batteries, galleys, fire ships, and rafts went under the Jersey shore at Red Bank, where they are collecting forces and raising works. I was relieved this evening by Captain Standish from one of the most horrid commands that ever man was upon, the whole place under water, and the battery itself knee deep. almost torn to pieces by the rebel shot, and made so badly at first that several shot have gone through, and we have no safety in it but by lying down on the platform.

October 16th.—The batteries have been firing a good deal this morning. This afternoon I relieved Captain Standish on the Island. A rebel barge with eight men deserted to us this day.

October 17th.—We fired a good many shells from our batteries into the fort.

October 18th.—I visited all the batteries on the island and fired several shells, which the rebels returned, but did us no mischief. We have it reported that General Burgoyne has been defeated,[1] and that General Clinton has taken Fort Montgomery and some other places on the North river by storm.[2]

October 19th.—I went to the batteries this morning and began to fire on the fort. The rebels opened all their batteries and blockhouses upon us; their grape shot came so thick that we could not stand to our guns. They damaged the middle battery so much that I was obliged to desist altogether from firing from it. One of our shells set fire to a quantity of powder in the fort. The rebels opened a battery from Red Bank and threw several shot over our 12 pounder battery. Two medium 12 pounders are fixed at this battery in lieu of the two rebel 18 pounders, one of which burst, the other was hauled off and is not to be fired any more. I returned to town, and made my report to the General of the damage the batteries had sustained. Orders were sent down not to fire any more till they were put in proper order again. An escort went last night to Chester to bring from the ships a 13 inch mortar, etc. Lord Howe and the fleet are now there. General Howe and the whole army are moved from Germantown close to Philadelphia, where redoubts are throwing up and other works, quite from the upper part of the town to the Schuylkill.

October 20th.—This morning about 4 o'clock a firing of cannon and musketry was heard near Gloucester Point. We roused all hands up and went to our batteries in town along the shore. We heard a number of boats rowing. We thought the galleys were coming to fire on the town, and just before daylight they came within hail of our sentry. They answered they came from our fleet. Twelve flat-bottomed boats, under the command of Captain Clayton, had pushed up in the night, and boldly run under the enemy's forts and batteries, and passed their whole fleet with the loss of one man. These boats come up with provisions etc., we imagine to facilitate a landing on the Jersey shore. This afternoon a great deal of cannon firing below, from our row galley and some of our advanced ships, and the rebel galleys and the forts and our batteries. This morning Major Farrington[3] came to me from

---

[1] The action of October 7th, in which (after a hardly contested fight against superior numbers), a portion of General Burgoyne's intrenched position near Saratoga was carried at the end of the day. The brave and able General Frazer was killed; 200 prisoners, nine pieces of artillery, all the equipage of a German brigade and a large amount of ammunition (of which the enemy were much in need) were captured.

[2] Sir Henry Clinton on October 6th, stormed and took forts Clinton and Montgomery situated on the north branch of the Hudson. The object was to open communications up the river with Albany, which would be useful when Burgoyne had established himself there. At this date nothing was known of his difficulties.

[3] Kane's List, No. 84.

Brigadier-General Cleaveland[1] to request that I would take the command of two 5½ inch howitzers ordered for immediate service. I was not ordered, he said, but the General hoped I would go as the service required a good officer. Ha! Ha! Ha! They were to be ready to embark at 4 o'clock in the morning. I had everything ready by 3 o'clock, the morning rainy and very cold at first, but cleared up as the day advanced.

October 21st.—Three battalions of Hessian grenadiers, one ditto Minigerode, one ditto Mirbach, with ten Hessian 3 pounder guns, and myself with the howitzers, began to embark in the flat-bottomed boats and other craft from the wharf at the upper end of the town, and crossed over to the Jersey side, landing without the least opposition. The whole were commanded by Colonel Donop. We began our march as soon as the last artillery were over, and about 8 o'clock at night came to Haddonfield, where we remained till 4 o'clock next morning.

October 22nd.—We again set forward and only had a few popping shots between this place and Red Bank where the rebels have raised a strong fort with cannon. It is absolutely necessary that we be in possession of this fort for it not only protects their vessels, but also would annoy our shipping very much in passing whenever we are lucky enough to get over their *chevaux-de-frise,* and it likewise commands Mud Island, so that should we take Mud Island, unless we had this fort also we should be very much disturbed from it. For these reasons General Howe ordered a detachment to storm it. Colonel Donop asked to be employed on this service, which was granted him, and myself and men were the only English on this duty. We arrived before the place about one o'clock; at noon we examined it, and saw the rebels at work which showed that the fort was not finished, or that they were adding something to it on hearing we were near them. I think, therefore, we should have stormed it directly without the least loss of time as it was to be done in daylight, but instead of an immediate attack, we did not begin till 5 o'clock in the afternoon. The advancing of the troops was preceded by a brisk and close fire of all our artillery which continued some little time. Colonel Donop then ordered the whole to cease, and called to his troops to advance. They did so with a quantity of fascines to fill up the ditch in front of the fort. Then began a very hot and close fire from the rebels, both of cannon and musketry which was kept up without intermission from the time our troops advanced till they retreated again. It is hard to say what was the cause of this attempt failing, but so it did, and whether from inability of the troops to fill up the ditch and mount the breastwork, from the loss of Colonel Donop and a number of officers at the first onset, or from being flanked by the row galleys with grape shot, whether from being tired from the march, or from want of spirit and activity to push forward over those who were killed and wounded in the front, is what I shall not presume to determine. It is enough to say that we were obliged to retire, and that in much confusion, for by this time it was quite dark. We retired about a mile all in bustle and disorder, then stopped about an hour or so to get the troops disposed into some order, and to collect the wounded and carry them in the best way we could, for not a waggon was thought of, and had it not been for the ammunition waggons a number must have been left behind. This night's march was as melancholy and as disagreeable a one as ever I experienced; it was dark and excessively cold; the roads were deep and narrow and enclosed with wood; we lost our way twice and had to turn about the guns and waggons in the narrow road; the very worst of all manœuvres. The horses were very bad and almost tired out, the drivers were a set of scoundrels. Add to this the groans of the wounded; the idea of being attacked in the rear by a sally from the fort while pent up in a road where we could not possibly make use of our cannon, and the probability of an encounter in front or flanks, for until day appeared we had no flanking parties out. We were lucky in meeting with no molestation except a few shot that did no harm. About daylight of the 23rd we repassed Haddonfield and continued our march to the ferry opposite Philadelphia where we arrived about 11 in the morning, so that, between 4 o'clock in the morning of the 22nd and 11 o'clock in the morning of the 23rd, we had marched about 42 miles, and been well thrashed into the bargain, so much for storming with———. I crossed the river and went home most heartily tired and very low spirited, for the rebels not only gained the advantage on shore, but they have had the satisfaction of seeing the *Augusta*, a 64 gun ship, and the *Merlin*[1] sloop blown up to-day. This fatal acccident I was told was owing to their running aground or upon the *chevaux-de-frise* in attempting to pass them, the galleys keeping a constant fire upon them the whole time. I have not heard what number of men were killed or wounded in the storm, or what number the men-of-war lost.

---

[1] Kane's List, No. 83.

October 24th.—A great many fascines are ordered to be made immediately and taken down to Province Island. I am informed to-day that the Hessians had about 400 killed and wounded, and that Colonel Donop is not dead but very badly wounded and prisoner. A great loss for he is a brave and good officer. A great many Hessian officers suffered in the attack.

October 25th.—I rode down this morning to Province Island. The galleys had been firing a few shot at our ships. I observed the rebels repairing the blockhouse that was blown up by our howitzers, and also at work at the battery at the lowermost point. We have now a 13 inch mortar on the island which is intended to throw pound shot into the fort.

It is very currently reported that General Burgoyne has met with a total defeat, that he himself is wounded and a prisoner, and that 5,000 of his army laid down their arms. Should this be true, I think we to the north are in a ticklish situation, and our prospect here is not the most pleasing. Our army is in want of provisions. We have no possessions but three or four miles round Philadelphia which is drained of everything. The rebels have cut off our communication to Chester by placing themselves in its neighbourhood. We now get our provisions with great risk, as the boats in their way from the shipping have to pass the fort on Mud Island and their vessels, and the work can only be done at night. The successes the rebels have met with will give them good spirits and I make no doubt will be the cause of a great many joining their army. If the river is not made passable the consequences may be bad; something must be done and that soon, for the longer we delay the stronger they will be. Lord Cornwallis and General Grant were over at the island to-day. I hope with intention to plan something for our good. The army will either be obliged to leave this place, or starve if our ships do not soon get up. Major Vatass and Captain Blackmore have been tried by a general court martial for their behaviour on the 11th instant on Province Island. The Major commanded the whole, the Captain commanded on the battery and scandalously suffered 60 or 70 rebel militia to take 50 English soldiers and two officers belonging to the 10th regiment and grenadiers. It seems he would not suffer his men to fire, and absolutely hoisted a white handkerchief as a signal of submission. The decision of the court is not yet known. This is one of the most disgraceful events that has attended us. Donald Maclean, a matross in the artillery, who was that day in the battery has received the thanks of General Howe in publick orders, and ten guineas for his behaviour and conduct. Maclean repeatedly pulled down the captain's white handkerchief, and the captain at length exclaimed, "Will nobody, will no grenadier, blow that artilleryman's brains out?" The Major and Captain were permitted to sell out.

---

[1] These ships with others passed through the opening in the lower *Chevaux-de-frise* and moved up to support the attack on Red Bank. The *Augusta* and *Merlin* ran aground and when trying to get them off the former caught fire and the flames could not be extinguished, the latter stuck fast and had to be destroyed. Such were the unfortunate consequences of the attack on Red Bank.

October 27th (Monday).—This afternoon about 3 o'clock I went down to Province Island and relieved Captain Scott.[1] It rained when I went and continued without intermission till Wednesday following and was exceedingly cold. The island is entirely under water and so deep in many places that the relief could not pass, consequently many were obliged to remain in this dreadful situation for 48 hours, without any cover, without any fire, and above their knees in water on the platform. This is at present the situation of Province Island, and it is expected that the trifling batteries on this island (notwithstanding all the improvements) are to silence a much superior fire better situated on Mud Island.

October 29th.—This afternoon with great difficulty and no small danger of being drowned, I waded from the island to the town. It is said a battery of some 24 pounders is going to be made on the island, and also a floating battery or two and nothing will be attempted till these are ready; that, then a general attack will take place, both from our shipping and from land. This afternoon Major Cuyler, aide-de-camp to General Howe, embarked from the lowermost end of Province Island with the mail and despatches for England. Sent letters to Mrs. Downman, also £50 which she is to receive of Mrs. Standish.

---

[1] Kane's List No. 274.—Captain A. J. Scott died in Newfoundland, September 1779.

October 30th.—Everything remains quiet about the town. Colonel Donop, who was wounded at the attack on Red Bank, is dead, much regretted. The Hessians at that attack did not lose any more than 180 men killed, wounded and missing. It would have been more to their honour if their loss had been greater. It is now past a doubt about General Burgoyne; he has suffered himself to be enclosed on all sides by the rebel army, and for want of provisions has been obliged to surrender his whole army prisoners of war, to be sent to England and not to serve during the present rebellion. Forty-nine pieces of brass cannon with all their ammunition waggons etc., are become an easy prey to the rebels, besides a great number of small arms. This is such a capital stroke against us that it is doubtful whether we ever subdue them. This added to our failures here will give them the greatest spirits and push them on (in all probability) to make an attempt on New York, or unite their armies and endeavour to retake Philadelphia. We are informed by an officer who has brought the horrid news that Captain T. Jones[1] and Lieutenant Clieland,[2] of the artillery, are killed, and Blomefield[3] wounded. General Clinton has been very successful up the North River; he has taken all the forts and strong places in the highlands, and opened a passage to New York.

The disaster at Saratoga having so momentous an effect on the narrative before us, it is opportune to mention here some of the causes which led to it.

The plan of this expedition was wisely designed, but it was a mistake to entrust its execution to General Burgoyne, who though a brave and a skilful officer was unacquainted with the continent of America, and had no experience of the kind of warfare peculiar to the country. Had the command been conferred on General Sir Guy Carleton, who so successfully defeated the rebel invasion of Canada in 1775, and who thoroughly understood the kind of troops he would meet, and the peculiarities and difficulties of the country in which he would operate, the campaign might probably have had a different result. The composition of the army was carefully and well arranged, but it was an error to send so large a train of Artillery (upwards of 50 guns), to move about in a wild and trackless region, though commanded by so energetic and able an officer as Major-General Phillips of Minden renown. The guns, it is true, were used with signal success and admirably and gallantly served on various occasions, yet in the end the train was an encumbrance, hampered the movements of the army at the most critical moment of its career, and was one of the causes which prevented its making good the retreat to Fort Edward. General Burgoyne has been too severely condemned for this misfortune, and the view held by his adversaries is no doubt a more just one than that of his own countrymen. The American historian Lee, one of the best and most impartial, and who commanded a partizan corps during the war, thus writes of Burgoyne:—"Where is the General who ever more prodigally risked his life in his country's cause than the unfortunate Burgoyne? Where the army which more bravely executed its leader's will, than did that which he conducted? What danger was avoided? What efforts unessayed? What privations not submitted to? What difficulties not encountered? But all terminated in disaster; and the army from whose prowess so much was expected, yielded to its equal in courage, to its superior in numbers." . . . General Burgoyne's force which had left St. Johns on the river Sorel numbering 7,200 men exclusive of artillery, amounted to about 5,700 men when it surrendered on October 17th, 1777, to the 13,000 under the command of General Gates.

---

[1] Kane's List No. 225.—Captain T. Jones was killed in the hard-fought action at Still Water September 19th his intrepidity was highly distinguished on the occasion.

[2] Kane's List No. 460.—Lieutenant Clieland was killed in the action at Skenesborough, July 6th.

[3] Kane's List No. 334.—Captain Blomefield was Brigade Major to Major-General Phillips, commanding the R.A. with Burgoyne's force. He afterwards commanded the R.A. in the expedition to Copenhagen in 1807, and was made a Baronet.

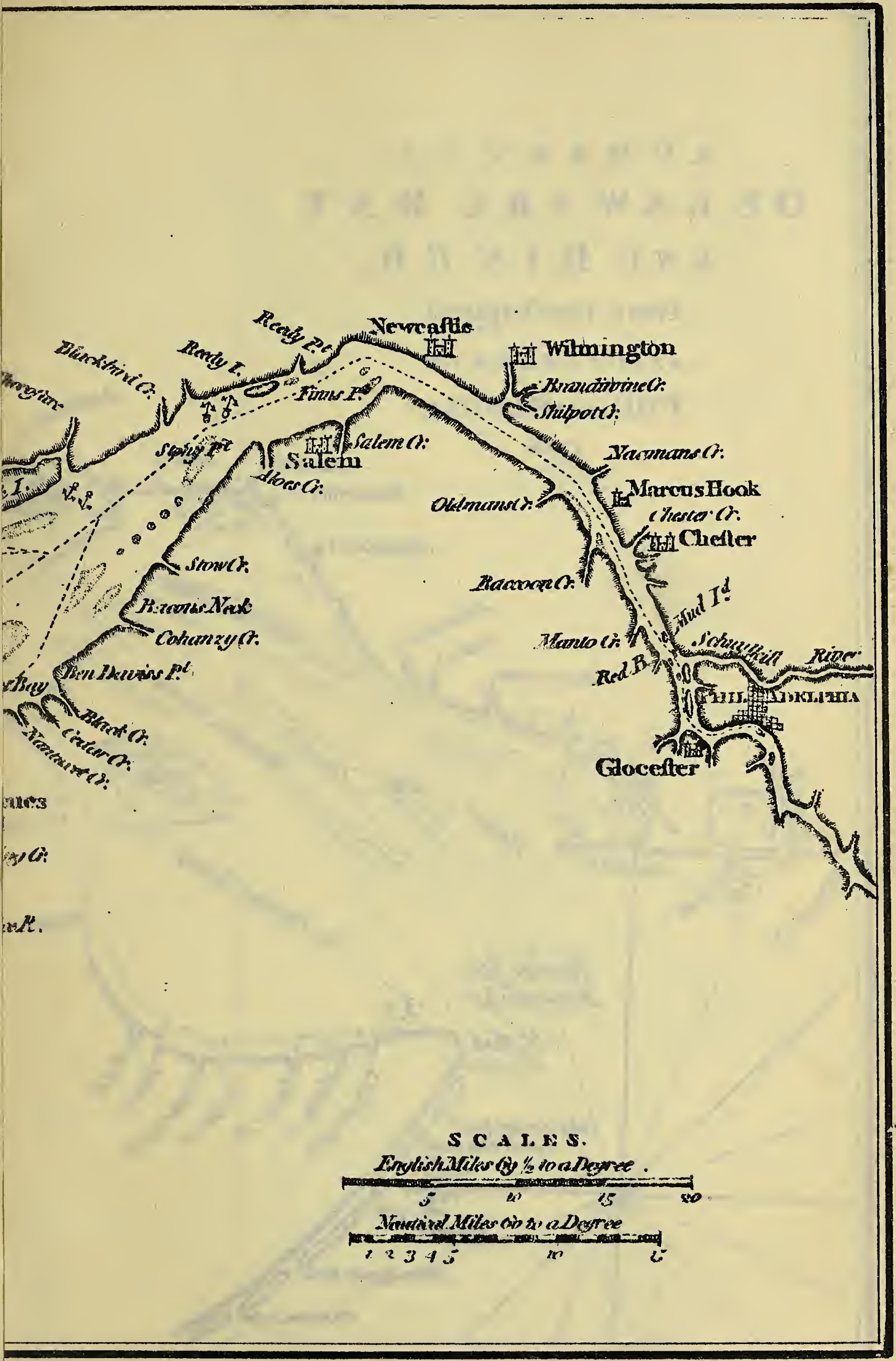
Sir William Howe cannot be held clear of all responsibility for this misfortune. After his failure to draw Washington to a general action from his position at Morris Hill and his return to New York in June, he embarked a great part of his army during the hottest part of the year, kept it in idleness for three weeks on board the transports, and then sailed, when he was sure to meet contrary winds, around the Capes of Virginia for Chesapeake Bay. If instead of making this expedition against Philadelphia, he had operated up the Hudson River towards Albany and stretched out a hand towards General Burgoyne, it is unlikely the Americans could have collected sufficient force to have overpowered his army.

Some reference to the important results which the surrender at Saratoga produced on the history of the American War will render more intelligible the subsequent narrative.

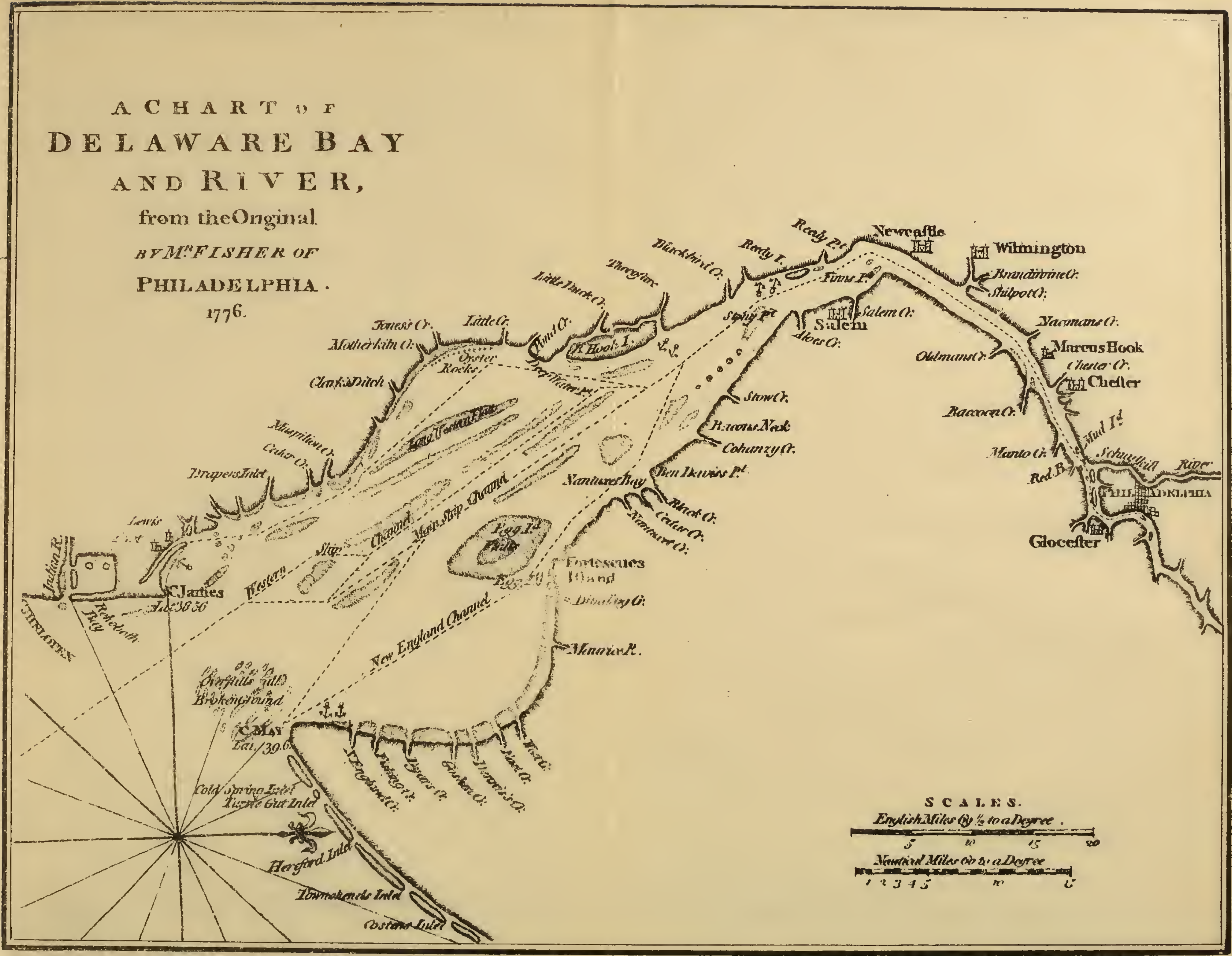
The early and rapid successes of the Canadian expedition under General Burgoyne at Crown Point and Ticonderoga, with the destruction of the American flotilla on the lakes, had raised most sanguine expectations in England respecting the results to be attained from its favourable issue; it was therefore with proportionate disappointment and despondency that intelligence of the total loss of this army was received. In this state of popular feeling the ministry decided to adopt every possible means to put an end to the war, by repealing the tax on tea, and appointing Commissioners with the fullest powers to treat with the Colonists for the removal of all grounds of complaint, and for opening intercourse with the mother country. To frustrate these overtures, the court of France, which from the beginning of the rebellion had secretly encouraged the rebels, and clandestinely supplied them with money, arms, and ammunition, now threw off the mask, and in February, 1778, entered into a treaty of commerce and a defensive alliance with the thirteen colonies of America, the result being the rupture of diplomatic relations between England and France in March, and the out-break of hostilities without declaration of war in June. Such were the political consequences which attended the capture of Burgoyne's army.

At the seat of war the effects were not less important. The capture of a whole army of their adversaries had a great effect on the *moral* of the American troops. Hitherto the superiority of the British troops in everything, and their almost universal success in the field had caused the Americans even when on equal terms to meet them with reluctance, but now the latter took heart, and animated with fresh ardour and increased confidence in themselves renewed the conflict with vigour, while at the same time the Congress was further stimulated to use its utmost exertions to recruit its armies and supply everything neccessary for their efficiency.

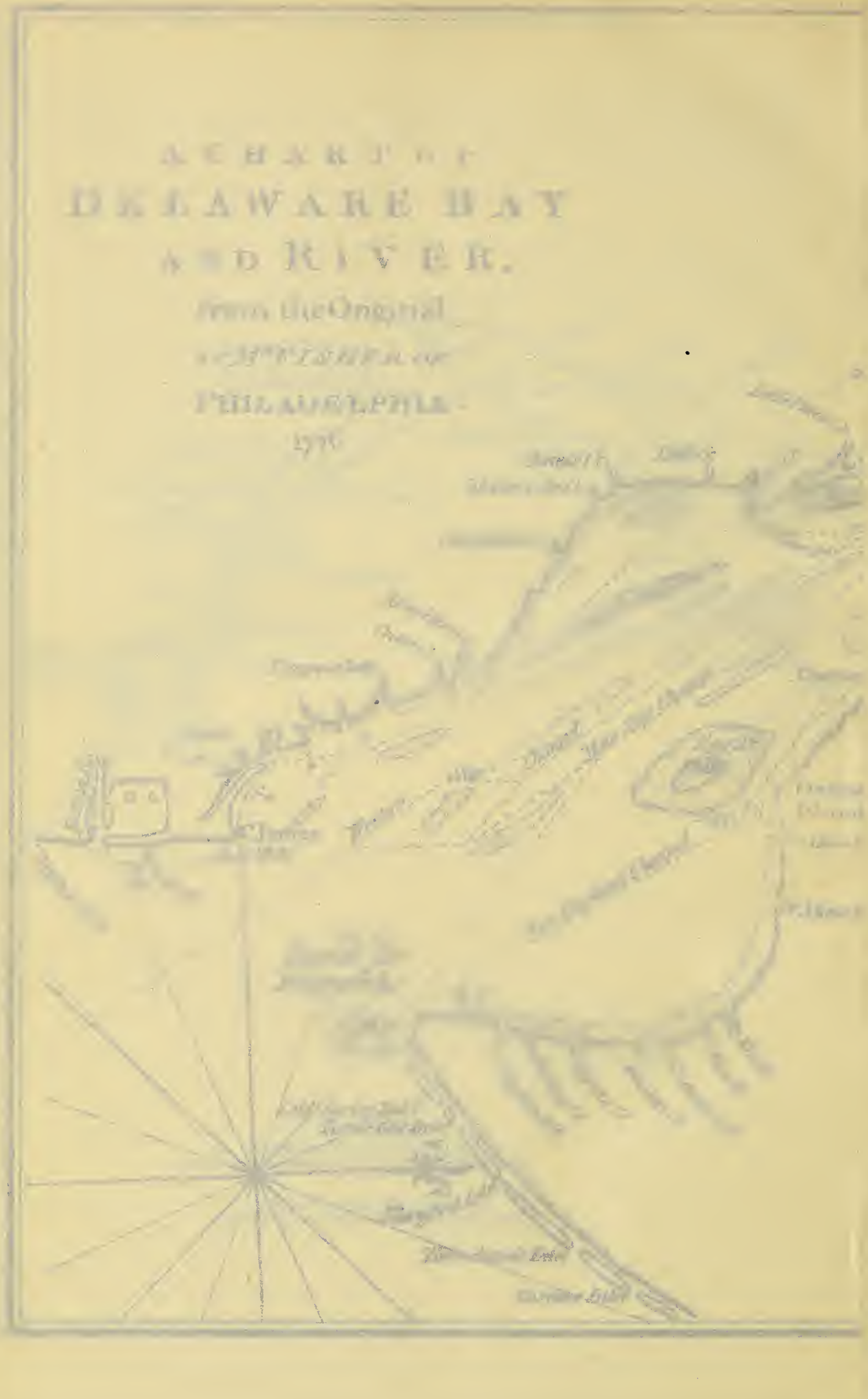
(To be Continued).



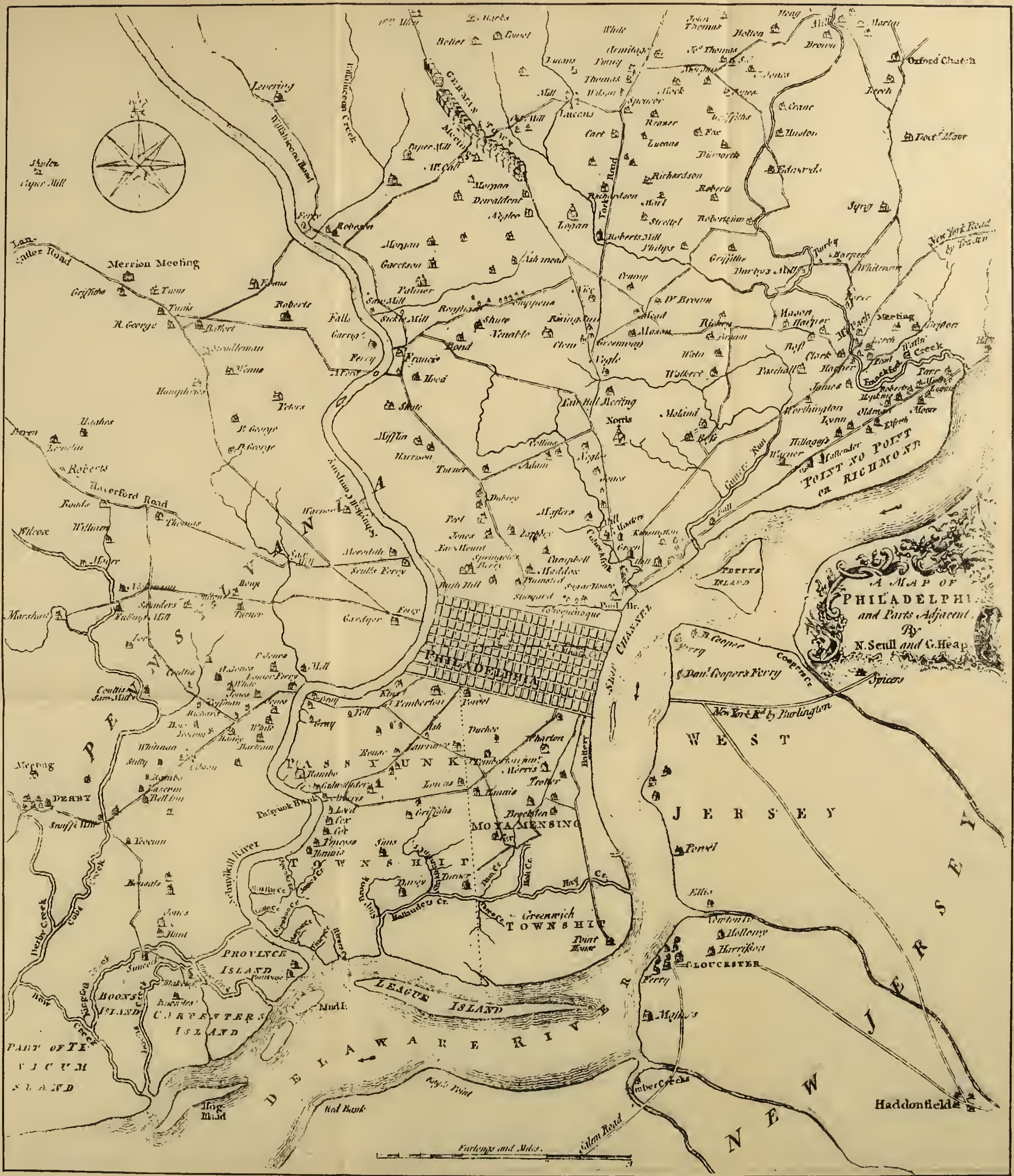
Newcastle
Wilmington
Brandiwine Cr.
Shilpot Cr.
Naamans Cr.
Marcus Hook
Chester Cr.
Chester
Mud Id
Schuylkill
River
PHILADELPHIA
Red B.
Manto Cr.
Raccoon Cr.
Glocester
Oldmans Cr.
Salem Cr.
Salem
Alloes Cr.
Finns Pt.
Reedy Pt.
Reedy I.
Blackbird Cr.
Stony Pt.
Stow Cr.
Bacons Neck
Cohanzy Cr.
Ben Davis's Pt.
Black Cr.
Cedar Cr.
Nantuxet Cr.
Bay
SCALES.
English Miles 69 ½ to a Degree.
5
10
15
20
Nautical Miles 60 to a Degree
1 2 3 4 5
10
15



A CHART OF
DELAWARE BAY
AND RIVER,
from the Original
BY Mr. FISHER OF
PHILADELPHIA.
1776.


A CHART OF
DELAWARE BAY
AND RIVER.
from the Original
by Mr FISHER of
PHILADELPHIA
1776

Wissahiccon Creek


A MAP OF
PHILADELPHIA
and Parts Adjacent
By
N. Scull and G. Heap
PHILADELPHIA
GERMAN TOWN
PENSYLVANIA
WEST JERSEY
NEW JERSEY
DELAWARE RIVER
Schuylkill River
Wissahiccon Creek
PASSYUNK
MOYAMENSING
TOWNSHIP
Greenwich TOWNSHIP
POINT NO POINT or RICHMOND
Pettys Island
PROVINCE ISLAND
LEAGUE ISLAND
BOONS ISLAND
CARPENTERS ISLAND
PART OF TENICUM ISLAND
Hog Island
Mud I.
Red Bank
GLOUCESTER
Haddonfield
DERBY
Derby Creek
Cobs Creek
Merrion Meeting
Lancaster Road
Haverford Road
New York Road by Trenton
New York Rd by Burlington
Salem Road
Frankford Creek
Oxford Church
Fair Hill Meeting
Wingohocking
Coopers Cr.
Dan. Coopers Ferry
Timber Creek
Shackamaxon
Kensington
Falls
Robeson
Levering
Paper Mill
Ferry
Furlongs and Miles

THE ARTILLERY AT DARGAI.

BY

LIEUTENANT G. F. MACMUNN, D.S.O., R.A.

THE storming of the Dargai ridge has naturally excited much interest both inside and outside the military world, while the devotion of the 1/2nd Goorkhas and the dash and discipline of the 3rd Sikhs and the Gordon Highlanders, created an enthusiasm of which nothing better could be said than that it was thoroughly merited.

It is not the object of this paper to describe the fight in detail, there are many better qualified to do so, and till reports and despatches are available, it would be impossible to do the subject justice. It was, however, said at the time of the fight that the artillery were of little use, the weight of their metal being utterly insufficient to produce any effect. This, on first thoughts, certainly seemed to have been the case, and the actual facts will be of interest to all gunners. Having watched the fight from a distance of some 4,000 yards with a telescope and having afterwards had the opportunity to go carefully over the whole ground, an opportunity which, I believe, none of the artillery officers actually engaged and but few others have had, I venture to think my observations may be of interest. I would first beg those officers engaged that day to pardon any minor errors of detail as to the exact positions and ranges of their batteries; they will not affect the general account, and I have only been privileged to hear the actual details of their doings from some of the batteries engaged.

The ridge of Dargai was the scene of two fights, viz, on the 18th and the 20th of October.

The force destined for the expedition to Tirah assembled finally at Shinawari, some 45 miles from Kohat, near the Kohat-Kurram road, immediately below the Chagru Kotal, over which there is a pass into the Khanki valley.

The artillery with the force consisted of Nos. 1, 8 and 9 Mountain Batteries R.A., and the following Native Mountain Batteries:—No. 1 (Kohat), No. 2 (Derajat), No. 5 Bombay, also No. 1 Kashmir; all armed with the 2·5″ 7-pr. gun of 400 lbs., save the latter, which had a 7-pr. gun of 200 lbs. No. 3 Field Battery was also up in Kurram, and No. 9 Field in Kohat.

No. 1 Mountain R.A. and Nos. 1 and 2 Native Mountain Batteries formed the artillery of the 1st division; Nos. 8 and 9 Mountain R A. and No. 5 Bombay Mountain Battery that of the 2nd division.

On the 18th inst. part of the 2nd division troops, under Sir Power Palmer, attacked and carried the Dargai ridge with only 13 casualties. On this occasion No. 8 Mountain Battery R.A. was with a flanking force on our left and did not come into action, No. 5 (Bombay) Mountain Battery was with the main attack, and No. 9 Mountain R.A. supported it from the Samana Sukh, that battery being camped on the Samana ridge, near Gulistan Fort.

Towards the end of the day General Palmer decided to withdraw from the ridge back to Shinawari, and about this time a large Afridi lashkar which had been in the Khanki valley, came up attracted by the firing to help the Orakzais. A heavy fire was opened on our troops, and several casualties occurred. Major Jennings Bramley of the Gordons was killed, and a party of the enemy tried to rush the Gordons' rear-guard, who were carrying off his body. This rush, however, was observed by No. 5 (Bombay) Mountain Battery, who were covering the withdrawal, and half-a-dozen shrapnel where discharged right into their midst effectually checking them. This prompt action probably saved us more casualties, which finally reached 63 in number.

No. 9 Mountain Battery R.A. retired to Fort Gulistan and No. 5 to Shinawari. This was the action of the 18th.

The action of the 20th was the commencement of the actual advance to Tirah. The 2nd division, under Major-General Yeatman-Biggs, was to cross the Samana by the Chagru Kotal, some 5,500 feet, and reach Karrappa in the Khanki valley some 13 miles from Shinawari, where the 1st division would join it—(See Sketch I). Now the Dargai ridge, held in force by the enemy, flanked at a range of some 1,800 yards, the pass over the Kotal and a descent from the ridge to the pass was an easy matter. Accordingly, it was necessary to again carry the ridge and occupy it. A start was made early in the morning. Brigadier-General Kempster's brigade, consisting of the Gordon Highlanders, 1/2nd Goorkhas, Dorsetshire Regiment, supported by the Derbyshire Regiment, were to attack Dargai. No. 9 Mountain Battery (Major Powell) was to come to its old position on the Samana Sukh; No. 8 Mountain Battery (Major Shirres, D.S.O.) and No. 5 Bombay (Captain de Butts) moved with General Yeatman-Biggs to the Chagru Kotal, where they were joined by No. 1 Kohat (Captain St. John) which had been pushed forward very early in the morning from the 1st division, camped a march behind Shinawari. Colonel Purdy, R.A., commanded this force of artillery.

The fight commenced by the batteries shelling the enemy's fortified positions. A glance at the accompanying sketches will explain the positions far better than words, suffice it to say that Dargai was only approachable in front by a narrow neck without cover commanded by heights 300 to 400 feet above it at a range of some 500 yards. After crossing the neck the party scrambled up to the top with only room for men in single file.

The out-line of the infantry attack is as follows :—

The 3rd brigade, under General Kempster, attacked, the 1/2nd

Goorkhas leading, supported by Dorsetshire and Derbyshire Regiments, the latter being lent from the 1st division.

The Gordon Highlanders and 15th Sikhs were in reserve on the Chagru Kotal, where also were the 3rd Sikhs.

The Goorkhas advanced to point *A*, (Sketches Nos. I. and II.), follow-by the other corps without much loss, but directly they appeared on the neck, all except the first rush, which succeeded in getting under cover at *B* (Sketch No. II.) were swept away. Small bodies of the Dorsets and Derbys also tried to cross, but almost every man was knocked over. On this followed several attempts with like success. No man could show his head over ridge *A*, and even where Colonel Travers, commanding the Goorkhas and those who had crossed to *B* were, there was not cover for more than about 60 men. While the first attempts were being made, officers and men thought they could get cover on the left of the neck, where there was actually no cover, though from *A* it appeared as if there was.

The total casualties were now well over the hundred, and of the total of 205 that day, almost all occurred on the fatal neck on a piece of ground about the size of a tennis court.

The neck was covered in dead and dying and not a man could show without being hit, and any wounded man who tried to crawl to cover or who even stirred was at once riddled; some of our men had as many as six bullets through them. The enemy, as will be seen by the picture, were in position about 300 feet above on cliffs behind sangars and from 350 to 500 yards distant, armed with Martinis, Sniders, even Lee-Metfords, and an abundance of ammunition. They are a people who have a wonderful natural proclivity for shooting, and those with any particular bent that way, train themselves to a great pitch. Lord Methuen, who was attached to Sir William Lockhart's staff, is said to have given it as his opinion that the Afridis are as good shots at 800 yards as the Boers at 400. Considering this, therefore, and that there appeared to be 400 or 500 yards steep climb in single file up an equally bare cliff side, it is not to be wondered that our troops hesitated and asked if the frontal attack was to be pressed home. To anyone watching from the ridge *A*, ten times the loss might be expected before the crest was gained. Report was made to General Yeatman-Biggs of the deadly nature of the enemy's fire and the strength of their position, but orders were received that the ridge must be carried and accordingly a heavy continuous artillery fire was opened, culminating in a few minutes of very rapid shrapnel and ring fire. In the meantime, General Kempster had called up the rest of his brigade, the Gordons and the Sikhs (viz., the 15th Sikhs). The 3rd Sikhs however were halted at much the same spot and by mistake they got the order to accompany the Gordons.

As the Gordons got behind the ridge *A*, Colonel Mathias addressed the now historical words to his regiment: "Men the General says the heights must be taken cost what it may, the Gordon Highlanders will take them," and directly the play of rapid fire ceased, he stepped to the front with his pipers and the leading company officers and the advance began, the pipes striking up the *"Cock o' the North."* Those who were present say it was worth living for, to see the air with which the pipe major swung his plaid and drones back over his shoulder as he stepped to the front.

Thus led, the Gordons almost simultaneously with the head of the 3rd Sikhs rushed across the neck, both corps losing heavily. Having reached shelter at *A*, they pushed on to *B*, by which time the enemy's fire slackened very considerably, and a confused mass of Highlanders, Sikhs, Goorkhas, Dorsets and Derbys surged up to the ridge, cheering wildly with all the excitement of dearly bought victory. For the last 200 yards or so of the advance, not a shot was fired, the enemy had fled, and the ridge of Dargai was ours with the loss of 205 men, not a large percentage of the force engaged, if it had taken place along a considerable front, but happening all on one fatal narrow tongue of land, other than which there was no road, it was a severe trial to men's nerves, and the discipline and élan which took the Highlanders and Sikhs across that patch already covered with corpses, was beyond all praise. The foregoing account, however is but a feeble one. The exact details are hard to come by, and small as the area was almost every one there has a diffierent conception of what took place. It is only meant to give sufficient idea of events, to allow the part played by the artillery to be understood.

That part was as follows:—

About 8 or 9 a.m., as has been said, Nos. 1, 5 and 8 Mountain Batteries opened fire from the Chagru Kotal, at ranges varying from 1,700 to 2,000 yards, while No. 9 Mountain Battery opened from the Samana Sukh, at something over 3,000 yards.

The position on the Chagru Kotal was perhaps 700 feet below the Dargai ridge. Thus the bullets from the shrapnel of the batteries there, would be flying upwards after burst or at least horizontally.

The battery on the Samana Sukh was on about the same level as Dargai, and its shell would have a considerable angle of descent.

Now the enemy's sangars were made of large loose stones, but there were any number of natural crevices on the top of the cliffs in which their marksman lay absolutely safe, save from a very plunging fire, while numerous other ledges and crevices only needed the addition of a large stone to make them equally secure rifle pits.

It is very evident that no metal that can be taken into the field could touch these, and as the sangars were on the absolute edge of a precipice, direct hits only by ring or common shell on the sangars could have done any harm.

The sangars too, were not more than a couple of feet high and presented no target for direct battering, even if such had been worth trying with a 7-pound shell of 2·5″ diameter. The only possible course was sustained, time shrapnel and ring shell fire, by which any men showing from behind cover or leaning over to shoot down at our men getting close under them, would be hit. The batteries were unmolested by the enemy, and as might be expected under such circumstance their fire was absolutely perfect, a steady spray of perfect shrapnel fire on some 300 yards of front, now concentrating at one point now distributed over the whole line. The fire ceased for a short while to allow the infantry to make their attempt, but was soon opened again and continued till about 3 p.m., a final burst of very rapid fire prefacing the advance of the Gordon Highlanders.

Now to consider the effect of the fire. When our men gained the ridge, the enemy had disappeared and had removed their dead and wounded, but as their position sloped from the crest back and they had ample time, there was no reason to expect to find bodies.

It has been said that the Afridi and Orakzai casualties were practically nil, and that the guns had little or no effect. This I venture to entirely disbelieve, what ever casualties there were, must have been almost entirely due to artillery fire for the enemy were absolutely protected from the long range volleys fired by the Dorsets and Derbyshires on the ridge *A*.

After the fight, the 30th Panjab infantry held the Dargai ridge for some weeks, one of their officers told me that there were 34 large patches of gore in the enemy's sangers, and it isnot every man hit who indulges in patches of gore, so much for the no casualty theory.

I carefully examined the whole of the enemy's position and *for 20 feet below the crest and on every rock or ledge and sangar on it, there were two or three bullet splashes per square foot at least for a front of 300 yards.* This was only what I expected from the appearance of the bursting shell as I watched them from Shinawari on the 20th.

I have no doubt in my mind that the shrapnel fire must have inflicted severe loss, no man of the enemy could have stood there save under cover, and no troops in the world could have taken the position if the enemy had kept up the fire as it was at the commencement. That they had plenty of ammunition left was evident from the heavy week's firing that succeeded the Dargai fight while both divisions were concentrating at Karrappa. The heavy fire kept up during the middle of the day and the rapid burst previous to the Gordons' advance, must not only have inflicted considerable loss but have demonstrated to the enemy, that directly our troops should have got beyond *B* and hence more underneath them, when it would be necessary (for the enemy) to leave their head cover and lean over their breastworks to fire down, in so doing they would be annihilated by shrapnel fire. The guns though silent were ready to open fire again directly the infantry were severely checked. To my mind this as much as anything else contributed to the enemy's timely flight, and our loss would have been twice or thrice as heavy if they had not fled till the last moment, indeed I doubt if the position could have been carried.

The artillery fire also cleared a number of the enemy out of the right of their position (as looked at in sketch 1) which had not as strong natural breastworks as the left.

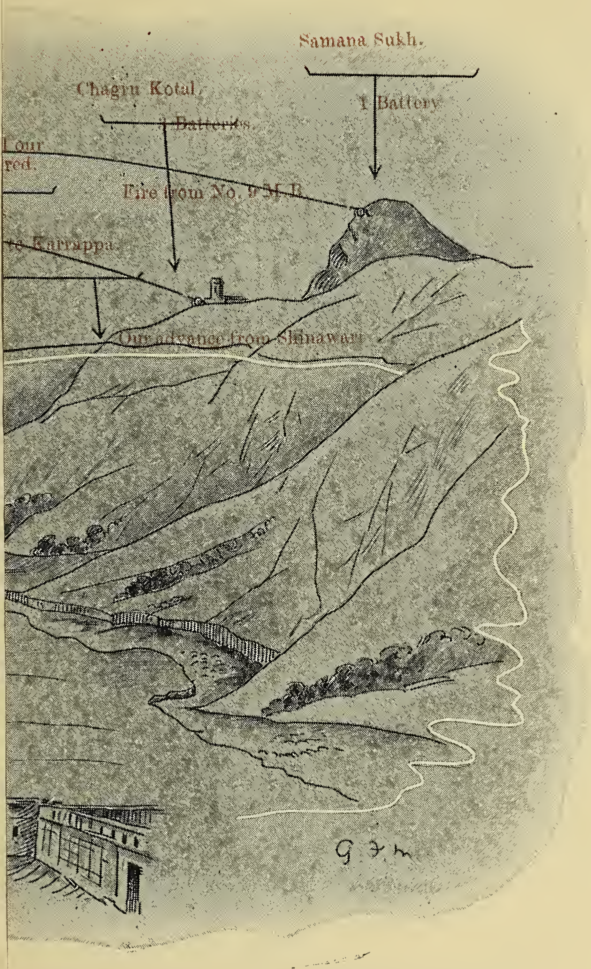
The accompanying sketches will, however, show how the position of our batteries necessarily rendered ineffective much of our fire, and I think the greater portion of the enemy's loss must have come from the battery on the Samana Sukh whose fire was plunging with considerable angle of descent.

The four batteries engaged fired some 1,300 rounds during the day, they had no casualties and while contributing most largely to the success of the day felt that their part had been but an easy one. They made up for this at the Sampagha pass where Captain de Butts, commanding No. 5 (Bombay) Mountain Battery, one of the best known of our Indian mountain gunners, was killed at the head of his battery.

In this fight Brigadier-General Spragge, R.A., commanded six mountain batteries which almost entirely won the day and saved our infantry from very heavy loss. It must remain for someone who was nearer that fight than I was to describe it, and also the part taken by the artillery at the taking of the Arhanga pass, and in the numerous trying rear-guard actions which have been such a feature in the present campaign in which the artillery casualties have not been light. It may be mentioned that all the officers of No. 2 Derajat Mountain Battery have had bullets through their clothes or accoutrements, though only one has been slightly wounded. Reviewing the Dargai fight as a whole I feel sure after carefully going over every part of the ground, that the artillery fire made the Gordons' determination of avail; without it they would only have been rolled back almost annihilated.

Some discussion has taken place in the Indian papers on our present mountain artillery gun, and its apparent failure at Dargai. From the foregoing I think I have made it plain that the gun was no failure. It is entirely a man-killing weapon, and siege guns cannot be looked for, some thousands of feet above the sea over goat tracks. Nor do I think the heaviest metal would have had much effect against so small a mark as the Dargai sangars presented. Possibly veryhigh-angle fire from behind the ridge *A* might have searched out the position, nothing else could. The comparative ease, however, with which the enemy obtained shelter is a striking object lesson of the efficacy of even light works against modern fire, and of the need for being able to use some high-angle fire against an enemy posted behind field works.

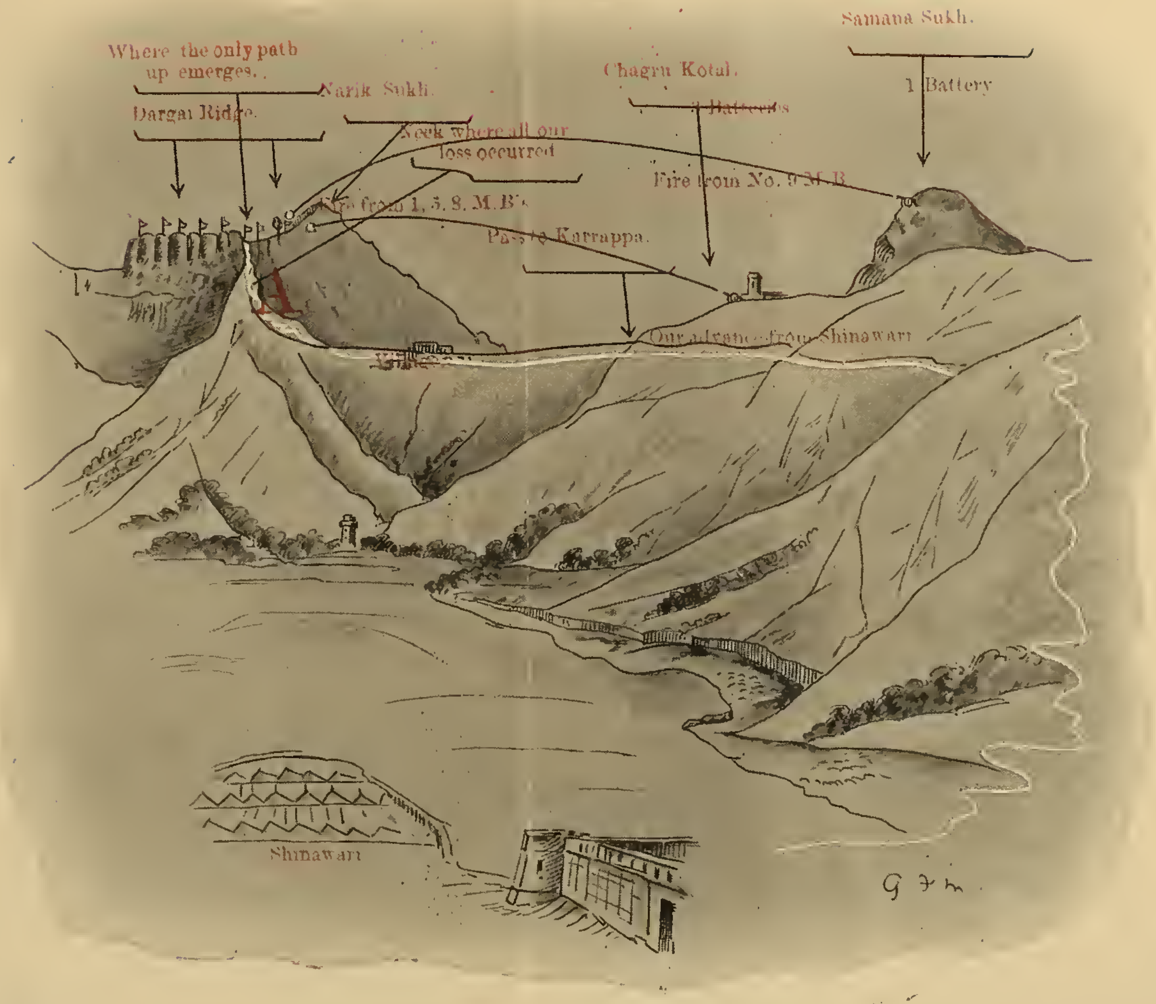
Dargai from Shinawari.


Samana Sukh.
Chagru Kotal.
1 Battery
2 Batteries.
Four
red.
Fire from No. 9 M.B.
te Karrappa.
Our advance from Shinawari
G.F.M.

s massed previous to attempting to rush the neck

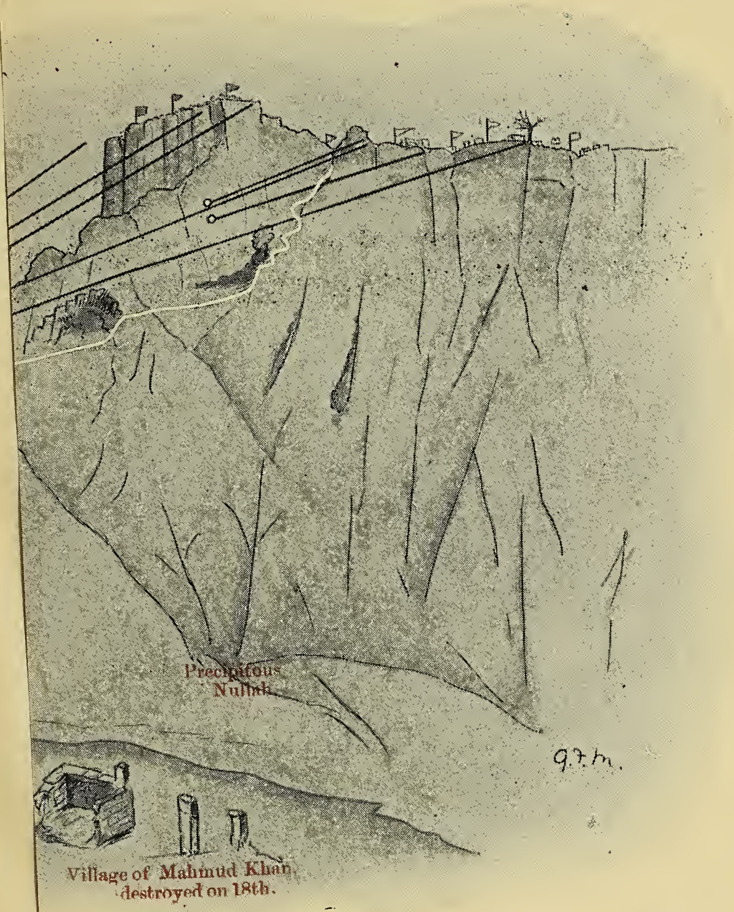
h advance.

SKETCH I. *Showing Dargai from Shinawari.*



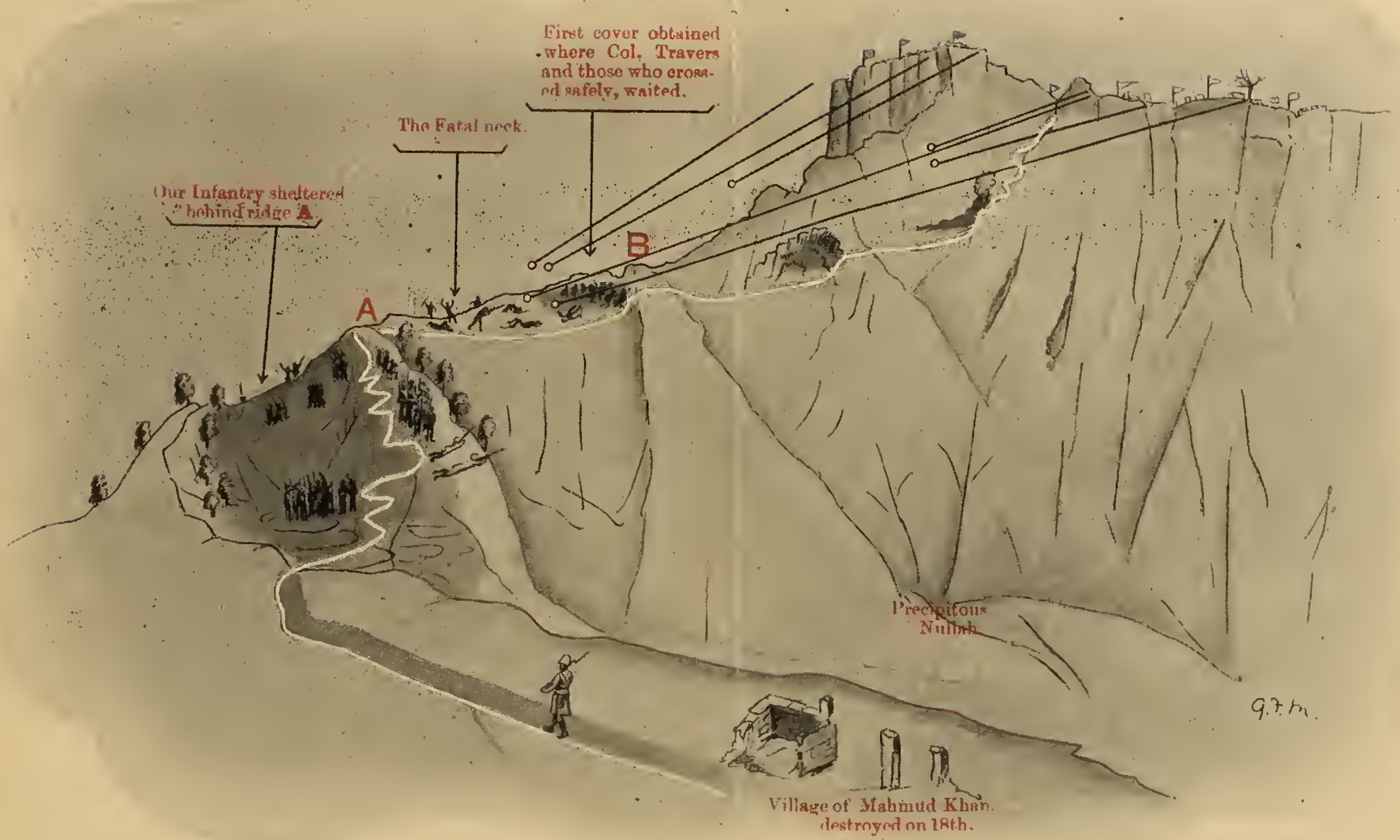
A. Ridge behind which our Troops massed previous to attempting to rush the neck

White line shows British advance


Precipitous Nullah
g.t.m.
Village of Mahmud Khan destroyed on 18th.

and 8 M.Bs., on the Chagru Kotal.

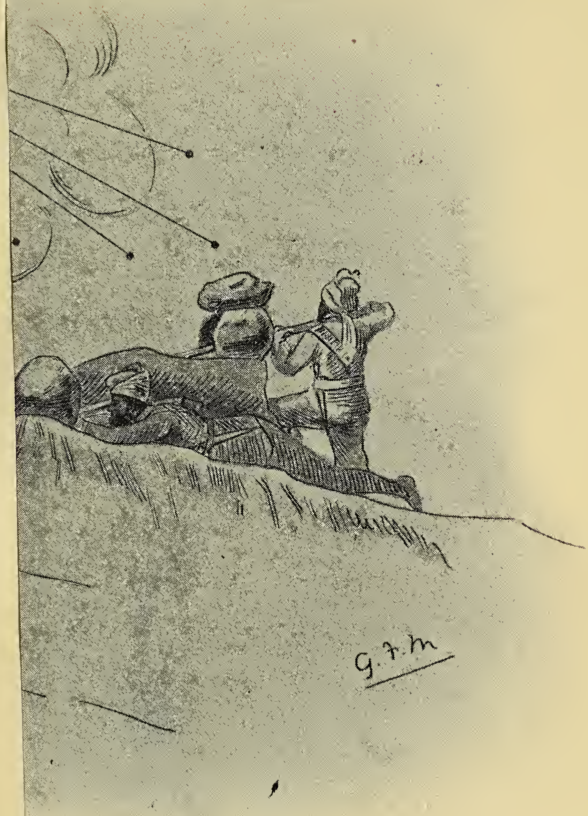
SKETCH II.


First cover obtained where Col. Travers and those who crossed safely, waited.
The Fatal neck.
Our Infantry sheltered behind ridge A.
A
B
Precipitous Nullah
G.F.M.
Village of Mahmud Khan destroyed on 18th.

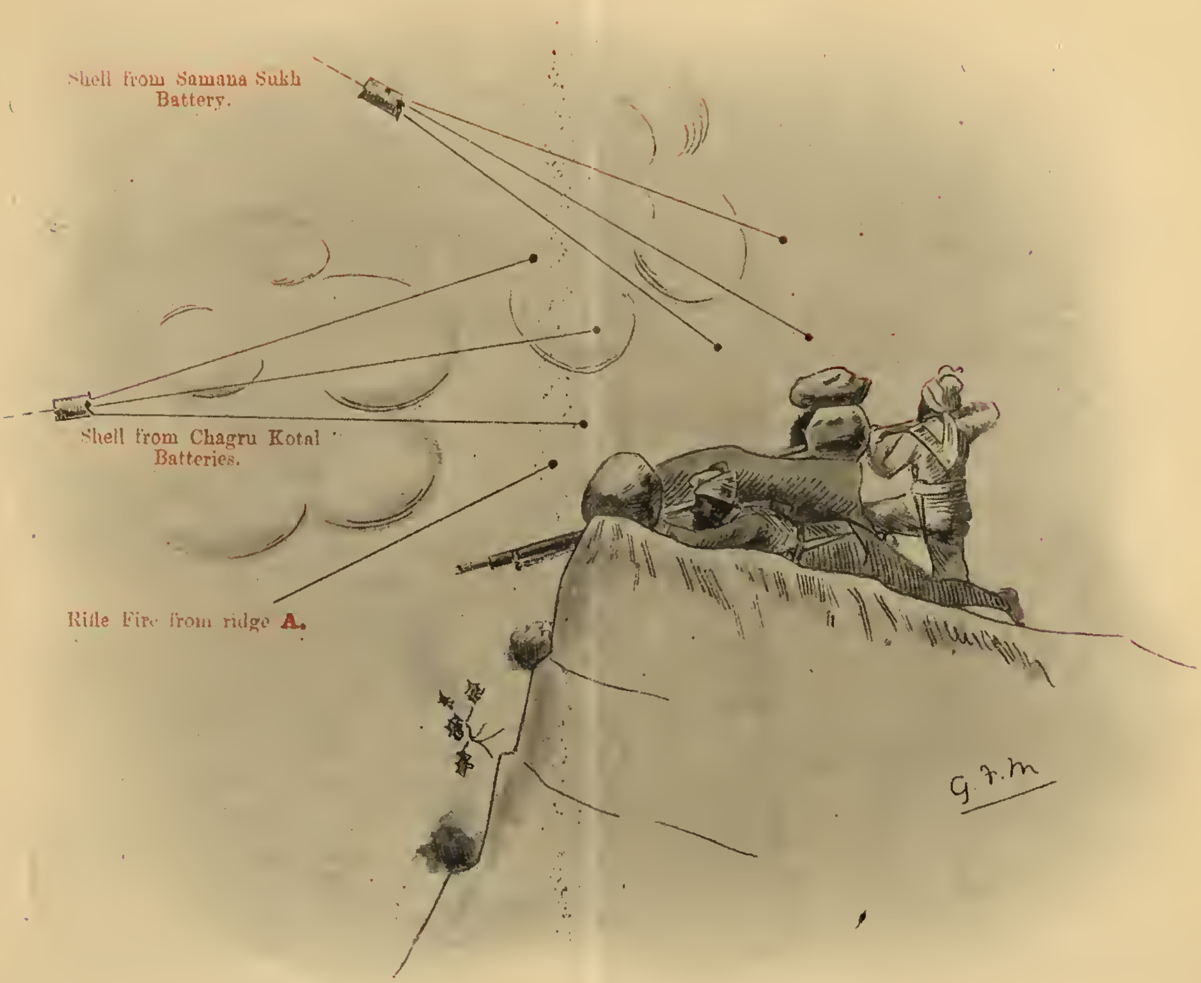
Sketch of Dargai as seen from the position of Nos. 1, 5 and 8 M.Bs., on the Chagru Kotal.
Scale about 1-Inch=80 yards
Path from Chagru Kotal shown in White.
***All loss occurred between* A *and* B.**

(NOTE.—The Black patches denote cover).

ual angle of the rock
ection it gave of itself,
ich gave so much cover
o.



SKETCH III. *Showing actual angle of the rock on top of the ridge and the protection it gave of itself, also the natural ledges of rock which gave so much cover with the help of a loose stone or two.*


Shell from Samana Sukh Battery.
Shell from Chagru Kotal Batteries.
Rifle Fire from ridge **A.**
G.F.M

DOCUMENTS RELATING TO EGYPT, 1798-9,

COMMUNICATED BY

LIEUT.-COLONEL H. W. L. HIME.

I.

PROCLAMATION of Buonaparte to his army before landing in Egypt, 28th June, 1798.[1]

"Soldiers!

You are about to make a conquest the effects of which upon civilisation and commerce are incalculable;—a conquest that, pending your delivery of her death-blow, will inflict a certain and serious wound on England.[2]

* * * * * * *

The people we are going among are Moslims, the chief article of whose faith is:—"There is no God but *the* God, and Mohammed is his Prophet." Do not gainsay them; act with them. Show to the doctrines and ceremonies of the Qur'an the same toleration you have already shown to the religion of Moses and of Jesus Christ. The Roman legions protected all religions.

* * * * * * *

Women are not treated here as in Europe. He who violates one in any country is a monster.

* * * * * * *

Only the few are enriched by pillage. It dishonours us; it destroys our resources; it makes enemies of the people of whom it is our interest to make friends."

II.

Having landed, Buonaparte issued a proclamation to the people of Egypt on the 1st July, 1798.[3]

"Long have the Beys who govern Egypte insulted the French nation and harassed its merchants: the hour of their punishment is come. Long has this gang of Circassian and Georgian slaves tyrannized over the fairest country in the world: God has decreed that their rule is ended.

---

[1] Paraphrased from Miot's "*Mémoires pour servir à l'histoire des expéditions en Egypte et en Syrie.*" Paris, 1814.

[2] We delivered our answer to this menace five weeks afterwards at the battle of the Nile, 1 Aug. 1798.

[3] From Baron de Sacy's "*Chrestomathie Arabe,*" III, 139.

People of Egypte! If any presume to tell you that I come to destroy your religion, believe them not. Tell them that I come to restore your rights, to punish usurpers, and that, far more than the Beys, I respect God, his prophet, and the Qur'an. Tell them that all men are equal before God; that men only differ in wisdom, ability and virtue.

But by what wisdom, ability and virtue are these Beys distinguished, that they should exclusively possess all that renders life pleasant and desirable? If there be a fine estate, it belongs to the Mamelukes. If there be a fine slave, she belongs to the Mamelukes; a fine horse, a fine house,—they belong to the Mamelukes. If Egypte be their farm, let these Mamelukes show us the lease that God has granted them.

. . . .

Kazis, Shaykhs, Imams! Tell the people that we are true Moslims. Is it not we who have overthrown the Pope who said war must be made upon Islam?[1] Is it not we who have dispersed the Knights of Malta, infatuated, who thought God willed them to make war upon Islam? Have we not been at all times the friends of the Sultan and the enemies of his enemies?"

* * * * * * *

III.

On the 21st and 22nd Oct. 1798 the Cairenes revolted against the French, and the Diwan of Cairo (at Buonaparte's instigation, no doubt) published a proclamation to allay the excitement.

"The French General has arrested those who joined in the disturbance before the house of the Shaykh ul-Islam, and two of these malefactors have been put to death[2] . . . The French never act with perfidy, especially towards widows; they hold such conduct in horror. . . . A christian tax-gatherer has been arrested for extortion. . .

The French General proposes to dig a canal connecting the Nile with the gulf of Suez, in order to put exported goods beyond the reach of brigands and Bedouins, and to facilitate the importation of merchandise from Yemen, India, and the East."[3]

A proclamation from the Shaykhs followed, in which the Cairenes are reminded that—

"Among European nations the French alone have ever been the friends of Islam and the enemies of idolatry and superstition. . . . They love those the Sultan loves and are the enemies of his enemies. Hence the hatred between the French and the Russians, who meditate the taking of Constantinople. . . The Russians are eager to seize upon Saint Sophia and other temples dedicated to the worship of the true God, in order to convert them into churches devoted to the profane exercise of their perverted religion.

---

[1] This passage did not appear in the 1st edition of Sacy's work, published in the early years of this century, as Napoleon concluded a Concordat with the Pope on 15 July, 1801.

[2] Some 5000 persons lost their lives during this 'tapage', as Napoleon called it.

[3] "The Barrage is a handsome bridge—putting the architecture out of consideration—the work of French engineers, originally projected by Napoleon I. It was intended to act as a dam, raising the waters of the Nile and conducting them to Suez, the Salt lakes, and a variety of other places through a number of canals, which however are not yet opened (1853)". *Pilgrimage to Al-Medina and Mecca*, by Sir R. F. Burton, Memorial ed., II, 30.

(*Signed*),

One who prays for you, the poor Seyyid Khalil Bekri, whom God [pardon !

One who prays for you, the poor Mustafa Sawi, whom God pardon !

&c. &c. &c."

On the 22nd Dec. a very remarkable Proclamation was issued on the same subject by Buonaparte himself.

"Is there anyone so blind as not to see that Fate itself directs all my actions ? Is there anyone so incredulous as to doubt that, in this vast universe, everything is ruled by Fate ? . . . The day will come when the world will see clearly that all my acts are ordered from above, and that the power of man cannot prevail against me."[1]

IV.

Buonaparte's Syrian expedition lasted from 11th Feb. to the beginning of June, 1799. On his return to Egypt, the Diwan of Cairo published a manifesto from which the following in an extract ;—

"The French General has assured us that he likes Musselmans, loves the Prophet . . . and is well acquainted with the Qur'an, which he studies daily with attention. . . We know that it is his intention to build a Mosque unrivalled in grandeur, and to embrace the religion of Islam."[2]

This passage may read like a page of the 'Arabian Nights,' but the statement of the Diwan in regard to the Mosque was based upon an actual promise given by Buonaparte. On the 11th Nov., 1800 (24th Jumāda II., 1215, A.H.) they addressed a letter to him in which, after complimenting him on the success of the Marengo campaign, they implored him to fulfil that promise.[3]

V.

A letter from the Shereef of Mecca, preserved by Sacy, shows that Buonaparte had written complaining that pilgrims on their way to the Holy Shrine did not receive proper protection from Mecca against the Bedouins. The object of this letter, of course, was to display his zeal for Islam before the Shereef, and to gain his good graces thereby. But the good will of the Shereef was far more likely to be won by another letter which appealed directly to his pocket. "The road from Suez to Cairo is safe for caravans," wrote Buonaparte, "and we have materially reduced the dues and taxes on imports. Make known these facts to the Arab merchants and stimulate trade between the two countries" (Miot). The Shereef did so, and with a close eye to business. On the 19th March, M. Poussielgue, the Administrator General of Finance, wrote to Buonaparte in Syria :—"The Shereef requests us to forward the usual annual purse. The total amounts to

---

[1] Miot, p. 106.

[2] Ib.

[3] "*Traduction littérale de la lettre écrite . . . . par les membres du Diwan de Kaïre, &c., &c.*," par A. I. Silvestre de Sacy ; Paris, 1801.

550,000 fcs., of which he personally receives 100,000 fcs.; a serious demand upon an unfortunate administration which has not a sou and is heavily in debt."

Why, it may be asked, did Buonaparte take the trouble to ingratiate himself with the Shereef of Mecca? Because he had resolved to make use of the Shereef as his postmaster for the transmission of his letters to the east. This is shown by the last para. of his letter to the Shereef, dated Cairo, 27th Jan. '99, in which he says:—"I enclose a letter to our friend Tippoo Sultan: oblige me by forwarding it to his country."[1] Poussielgue received an acknowledgment of these letters from the Shereef on the 19th March, and another dated Mecca, 24th April, the Arabic original of which is given by Sacy. "We have duly received letters from General Buonaparte," writes the Shereef, "to be forwarded to your agent at Mocha, the Imam of Muscat, and Tippoo Sultan of Mysore. They have been confided to trusty messengers, and, God willing, answers to them will be shortly received." Whatever may have been the will of Heaven, the Shereef himself took effectual steps to prevent answers from ever being received. The following is the Indian Government's official translation of Buonaparte's letter to Tippoo.

"FRENCH REPUBLIC.

[LIBERTY EQUALITY

Hd.-Qrs., Cairo, 27 Jan. 1799.

BUONAPARTE, Member of the National Convention, General-in-Chief, to the most magnificent SULTAN, our greatest Friend, TIPPOO SAÏB!

You have already been informed of my arrival on the borders of the Red Sea, with an innumerable and invincible Army, full of the desire of delivering you from the iron yoke of England.

I eagerly embrace this opportunity of testifying to you the desire I have of being informed by you, by the way of Muscat and Mocha, as to your political situation.

I would even wish you to send some intelligent person to Suez or Cairo, possessing your confidence, with whom I may confer.

May the Almighty increase your Power and destroy your Enemies.

(*Seal*). (*Signed*) Buonaparte."

Appended to this letter is the following note by Captain S. Wilson, our Political Agent at Mocha:—"Copies of the above letters" (to the Shereef and Tippoo) "were given to my Moonshie for me by Shaykh Soliman and Mahomed Ameen, the Shereef's 1st Vizier and 1st Secretary.

(Undated). (*Signed*) S. Wilson."

These documents Wilson forwarded to the Governor in Council, Bombay.

We might have acquitted the Shereef of all knowledge of this transaction, had the copies of the letters been secretly conveyed by an obscure official to Captain Wilson personally; but seeing that they were made over by his two chief officers to Wilson's Moonshie, the inevitable inference is that the Shereef was well aware of what was going on. He found himself in a dangerous position, and endeavoured to extricate himself from it by 'running with the hare and barking with the hounds.' On one point, however, he spoke the truth; the letters had certainly been "confided to trusty messengers," his first Vizier and his first Secretary. He thought it unnecessary to add, that it was for the purpose of sending them to a British Captain, not an Indian Prince.

---

[1] "*Correspondence inédite officielle et confidentielle &c., de Napoléon.*" Paris, 1819-20; IV, 192.

Captain Wilson's note is an enigma. When did he receive these papers? We can only be certain that he received them after 21st February. Where did he receive these papers? Not in Mocha; unless we suppose the Vizier and Secretary to have gone there, which is too wild a supposition to be entertained. In all probability Wilson and his Moonshie came to Jedda in a war-ship. "Several war-ships have been lately at Jedda," wrote Poussielgue to Buonaparte, "but the Shereef has not permitted the English to land. All communications between the ships and the shore have taken place through an interpreter." Perhaps so; but the Moonshie was not English, and in all likelihood he got to shore and secured the papers.

VI.

What were the documents forwarded to Bombay by Wilson, on which he wrote his lucid minute? If they were the originals, why did he not say so, and why did he refer to the copies which were a matter of interest to no one? If they were not the originals, were they mere copies of his copies? I am unable to answer any of these questions, and can only venture the surmise that the Moonshie got possession of the copies first, and afterwards succeeded in obtaining the originals. However this may be, the originals somehow changed hands. Buonaparte's letter is given in "Copies and translations of official documents relative to . . . Tippoo Sultan, Nawab," published by the Indian Government at Madras, 1799, and it is marked 'intercepted.' Tippoo, therefore, never received Buonaparte's letter. But even if the Shereef, after making over copies of it to Wilson, had forwarded the original to its destination, its contents would not have influenced the course of affairs in Mysore. Tippoo's ruin had been already accomplished. Deceived by empty promises of help from the French authorities in Mauritius, and deluded by the lies of one Ripaud,[1] the illiterate master of a French privateer, who made his way to Seringapatam, this unhappy Prince became embroiled a second time with the Anglo-Indian Government. War was made against him;

---

[1] One of Tippoo's ministers, Mohammed Rezza (the Binki Nawab) thus speaks of Ripaud in a memorandum to Tippoo which is endorsed by remarks written by Tippoo himself:—"From first to last the language of this man has been that of self-interest and falsehood. . . From the erroneous statements of this scoundrel the strongest doubts have arisen etc. etc." See the official translations of Tippoo's private papers in Appendix, Paper A, No. 8, of the "Review etc. of the late war in Mysore," with an introduction by Col. M. Wood, M.P., late Chief Engineer, Bengal; London, 1800. The Nawab's appreciation of this adventurer's character is completely supported by facts.

he was besieged in his capital; and was killed fighting bravely before the door of his palace, 4th May, 1799.

VII.

Those who have served in the East will at once detect a serious error made by Napoleon during his sojourn in Egypt, an error which arose from his ignorance of Mohammedan modes of thought. He over-acted his part as an amateur Moslim. Mohammedans look on proselytes with deep suspicion. Sir Richard Burton, who knew them thoroughly, says in a note to the "*Arabian Nights*" (624th Night):—A convert to Islam "is theoretically respected and practically despised. The Turks call him a *Burma*, a twister, a turncoat, and no one either trusts him or believes in his sincerity."

MANŒUVRES OF THE XIV GERMAN ARMY CORPS, 1897.

(WITH MAPS).[1]

BY

COLONEL A. E. TURNER, C.B., A.A.G., R.A.

AS in 1896 the German Emperor most graciously accorded permission to me to attend the manœuvres of the XIV Army Corps, which is composed of Baden troops and has its headquarters at Karlsruhe, the capital of Baden.

It is still commanded by General von Bülow, who was Military Attaché at Paris when the war of 1870–71 broke out; during the war he was on the staff of Prince Charles Frederic, and was present at most of the battles in which the 2nd Army took part; he bears a very high reputation both as a soldier and statesman, and when it was generally rumoured this summer that Prince Hohenlohe was about to resign the Chancellorship of the Empire, there was a consensus of public opinion that General von Bülow would be appointed by the Emperor to succeed him.

His three general staff officers are Colonel Baron von Vietinghoff, Major von Lindenau, and Hauptmann von Winterfielde; the former was aide-de-camp to the late Emperor Frederic, and is a highly accomplished staff officer, while Major von Lindenau who was general staff officer of the 29th Division last year, and who received special praise for his work, is well known as the author of an excellent account of the retreat of Napoleon from Moscow, in which the Baden troops played such a prominent part at the crossing of the Beresina on the 26th and 27th November, 1812, when they, with the Saxons and Hessians, formed the rear guard of the "Grande Armée" whose retreat across the river they covered, and then crossed in safety themselves, after fighting a victorious action with the Russians at Studienka on the left bank.

The 28th Division, to the staff of which I was attached for the first part of the manœuvres, is commanded by Lieutenant-General von Grone, who saw much fighting in the war of 1870–71. His Staff Officer is Major von Schwerin a descendant of Frederic the Great's Marshal.

---

[1] The small map is a portion of the large one and is published to give a better idea of the hills over which many of the operations were carried out.

The 29th Division, whose head-quarters are at Freiburg, and which was commanded last year by the Erbgrossherzog of Baden, is now under General-lieutenant von Bissing, who took up the command just before the beginning of the manœuvres, up to which time he was Brigadier-General Commanding the Cuirassiers of the guard at Berlin. He is considered to be one of the best officers in the army, and is said to be highly esteemed by the Kaiser.

The 28th Division is composed of the 55th and 56th Infantry Brigades, the former of which is commanded by General-Major Carl von Hugo and is composed of the 25th and 111th Regiments, with head-quarters at Karlsruhe. The 56th Brigade is stationed at Rastatt, and its commander is General-Major Konrad von Hugo; its regiments are the 109th and 110th.

The 29th Division is composed of the 57th and 58th Infantry Brigades; the former having the 113th and 114th Regiments, the latter the 112th, the 142nd and the 170th, which is one of the new regiments made out of the four battalions, taken away from the various regiments.

Four Jäger battalions, the 4th, 8th, 10th and 14th, are apportioned to this Corps, also two regiments of Artillery, the 14th with three Abtheilungs of Field Artillery with three batteries each, and one of Horse with two batteries. This regiment is stationed at Karlsruhe and is commanded by Colonel von Oppen, while the 30th Field Artillery Regiment, stationed at Rastatt, has four Abtheilungs of three batteries each (one Abtheilung being at Neu Brisach), and is commanded by Colonel von Schubert.

The Cavalry of the Corps consists of the 14th, 20th, 21st and 22nd Dragoons, stationed at Kolmar, Karlsruhe, Bruchsal, and Mülhausen. The 21st took part in the Imperial manœuvres at Homberg. The 14th and 20th were attached to the 28th Division, and the 22nd, to the 29th. General-Major von Kuhlmay, who commands the 29th or Southern Cavalry Brigade, with head-quarters at Colmar, commanded a side or acted as chief umpire, his brigade being broken up.

The Artillery General of the Corps is General-Major von Reichenau. The pioniers and pontoon train are stationed at Kehl.

All the batteries of the Corps have six guns, I believe because it is situated on the frontier.

The country is highly cultivated up to the foot, and often far up the slopes of the mountains, and on this account much difficulty arose, and numerous situations which would not have taken place in real warfare, occurred owing to the necessity of avoiding vineyards, tobacco fields and the like; for it is not the case that the Germans, any more than ourselves, go recklessly across country destroying crops and cultivation, unless it is impossible to do otherwise. In all cases damages are most carefully assessed and paid for. I fear that this year, owing to the prevalence of rain, the damages (Flurkosten) in Baden were considerable, in spite of the great care taken.

The corps appear to be in the highest possible condition of training and efficiency, but in this respect it is only a counterpart of nineteen other corps, which make up the German army, forming a magnificent total of—

624 Battalions
465 Squadrons
494 Batteries Field Artillery
37 Battalions Foot Artillery
23 Battalions Pioneers
7 Battalions Railway Troops
21 Battalions Train

The manœuvres of the 28th Division took place between Oberkirch and Rastatt, and lasted from the 10th to the 18th September. The tract of country used, lies just at the foot of the range of hills, which form the western edge of the Black Forest, and while the scenery was as beautiful as it could well be, it may be imagined that the numerous spurs, which ran into the manœuvre terrain and which were often covered with vineyards, as well as the streams swollen by continuous rain, which run from these mountains into the valley of the Rhine, did not tend to facilitate the operations.

As directed by the Kriegs-Ministerium at Berlin, I reported myself to General von Grone at Achern on the 10th November, where General von Bülow and his Staff arrived the same evening to see the manœuvre of the following day. Nothing could exceed the kindness and cordiality of my reception, which was the same that I had always met with from German officers on the many occasions that I have had the privilege of associating with them.

These manœuvres, though by no means equal in magnificence as a spectacle to the Imperial manœuvres, in which several army corps were engaged, were of greater interest to me, as one is much better able to obtain a correct impression of the working of troops and their tactics from watching the operations of a small force, than those of an army of over 100,000 men with a front extending over several English miles.

General Idea.

The general idea was as follows:—

A Northern army has crossed the Rhine at Selz, a Southern army is assembling in the south of Württemberg, Strassburg is held by part of the Southern force, and portion of the Northern force is proceeding to invest it from Zabern. The bridges over the Rhine from Kehl as far as and including that at Roschwog are destroyed. The Southern army is in its own country.

The special idea for the South on the 11th September was as follows:—

On the 10th September the Commander of the Southern army, which is assembling in the south of Württemberg, sends the 56th Infantry Brigade which he has specially reinforced to keep open the roads from Freudenstadt, which lead to the Débouchés of the Black Forest, for the ulterior advance of the army. Late in the evening of the 10th the Brigade reaches and goes into bivouacs at Ottenhofen and

Seebach; here information is received that Bühl is occupied by the enemy's Cavalry and Infantry. Early on the morning of the 11th patrols of his Dragoons are fired at by the outposts and retire on Kappelrodeck. (Sd.), Von Grone.

Commander of Southern Force, Oberst von Hochawchter.

Troops: Total 7 battalions, 4 squadrons, 3 batteries.

Place of rendezvous, Kappelrodeck.

The Infantry is not to advance beyond the East of Kappelrodeck before 9 a.m. The Cavalry not before 8.45 a.m. Officers' patrols of the latter not before 8 a.m.

The orders given by the Southern Commander were as follows:—

Detachment Orders. Seebach. 11-9-97. 12.30 a.m.

(1.) The enemy occupied Bühl yesterday with Cavalry and Infantry.

(2.) I shall advance to-day by Achern on Bühl (in order to keep open the roadways leading from Freudenstadt to the exits west from the Black Forest).

(3.) The Advanced Guard will march from the west exit from Ottenhofen by Achern on Bühl.

The Cavalry will reconnoitre towards the line Bühl-Ulm-Lichtenau. An officers' patrol, which will receive special instructions from me, will proceed by Obersasbach to Lauf.

(4.) The main body will follow at a distance of 1,000 metres (1,110 yards).

(5.) The heavy baggage under escort of a section of Dragoons (supposed) will march from the east exit of Seebach at 9.20 a.m. and will follow the advance of the detachment as far as Ober-Achern, and will halt at the southern end of that place till further orders are received.

(6.) I shall be with the main body of the Infantry of the advanced guard.

ADVANCED GUARD.

Commander Oberst von Roder.
14th Dragoons (less 1 squadron and 1 section).
1st and 2nd Battalions, 25th Regiment.
No. 3 Company, 14th Battalion Pioniers.

MAIN BODY AND ORDER OF MARCH.

1 Section, 14th Dragoons.
3rd Battalion, 25th Regiment.
2 Field, 1 Horse battery, 14th Regiment.
111th Regiment.
4th Battalion Jägers.

Dictated to Orderlies.

(Sd.), Von Hochwachter,
Oberst and Regiment's Kommandeur.

Special Idea for North.

A portion of the troops, which have crossed the Rhine at Selz, has halted at Rastatt; another portion, the 56th Infantry Brigade which has been reinforced, marches southwards with the object of blocking the roads leading from the Black Forest at Achern and Oberkirch; and on the evening of the 10th September has gone into bivouacs at Bühl and has pushed out outposts towards Ottersweier.

At 7 a.m. on the 11th its commander receives the following report:—

3rd Squadron, 14th Dragoons, Ottenhofen, Officers' Patrol. 11. 9. 5. a.m.

The enemy is in bivouac between Ottenhofen and Seebach. Ottenhofen occupied.

(Sd.), A.
Premier-lieutenant.

(Sd.), Von Grone.

Troops: Total 9½ battalions, 4 squadrons, 4 batteries.

The following orders were issued by the commander of the Northern Force, Colonel von Fallois, who commands the Life Grenadier Regiment, No. 110.

Brigade Orders. Bivouac, Buhl,
11. 9. 7.15 a.m.

(1.) During the night the enemy has been in bivouacs between Ottenhofen and Seebach, and has occupied Ottenhofen.

(2.) I am going to block the roads leading from the Black Forest at Achern and Oberkirch.

(3.) The independent Cavalry will trot to-morrow at 8.15 a.m. from the southern end of Ottersweier towards Sasbach through Achern to Fautenbach, with the object of ascertaining the strength and position of the enemy reported to be at Ottenhofen and Seebach, and to reconnoitre the road leaving the Black Forest at Oberkirch in the direction Renchen—Zimmern.

(4.) The head of the advanced guard will march from the northern end of Ottersweier to-morrow at 9 a.m. on Sasbach, will keep up communication with the independent Cavalry and will advance by Obersasbach and Oberachern towards Kappelrodeck.

(5.) The main body will march at 9 a.m. from the southern end of Bühl on Ottersweier and will follow the main body at a distance of 1,200 metres.

(6.) The heavy baggage, which will be escorted by 1 Unteroffizier and 12 Dragoons, of the 3rd Squadron 14th Dragoons, will park at 10 a.m. north of Bühl on the roads leading to Steinbach.

(7.) Reports will be received by me at the main body of the advanced guard.

(Sd.), Von Fallois,
Oberst.

The orders sent in writing to the Independent Cavalry and Advanced Guard and dictated to the Orderlies of the Mainbody.

P.S.—Officer's patrols may pass the southern end of Ottersweier at 8 a.m.

Rendezvous: Independent Cavalry, northern end of Ottersweier, 8 a.m. Advanced Guard, northern end of Ottersweier, 8.15 a.m. Mainbody on the Bühl-Ottersweier road, north of height marked 133 at the cross road to Hatzenweier.

INDEPENDENT CAVALRY.

Commander Major Freiherr von Leoner.
3 Squadrons, 20th Dragoons.

ADVANCED GUARD.

Commander Oberst, Freiherr von Spiegal.
1 Squadron, 14th Dragoons (less 1 section).
3rd and 10th Battalions Jägers.
1 Pionier Company.

MAIN BODY.

9½ Battalions, 4 Squadrons, 4 Batteries, &c.

The development of events was curious; South having to keep the roads leading from the Black Forest at their exits from the valleys would naturally be nearer to the exits than the enemy who was to block them, but by marching from Sasbach on Obersasbach, the Northern force came to be between the Southern and the hills, while he pushed on two battalions of Jägers who held Achern and blocked the advance of South. I rode to Kappelrodeck with General von Grone and staff, and remained with the Southern Force. I met a number of officer's patrols who were scouring the country, followed by the Independent Cavalry, who were to reconnoitre the long line Bühl-Ulm-Lautenbach, while a special officers' patrol was on its way to Lauf to watch the right. When the Cavalry reached Achern they were received with infantry fire from two battalions of Jägers, who lined the southern edge of that town. The Dragoons retired and hit upon the head of their advanced guard at Oberachern. Information was then received that the main portion of the northern troops had left the main road, Bühl-Achern, and was proceeding on Obersasbach, threatening the right of the South, the advance of whom was stopped at Achern. The southern commander then promptly turned to his left and took up a position above the Acher flanking North's advance—the Artillery being massed in the centre. In the meantime the Northern Artillery came into action on the high ground south of Obersasbach, and under cover of its fire North formed front to its right flank; so that each force had formed front to flank, and both were facing the direction or nearly so of their line of communications, reminding one, *parva componere magnis*, of the situation of the Germans and French on the 18th August, 1870, at St. Privat-Gravelotte.

After the Artillery duel had gone on for some time, North pivoting on Achern made a vigorous attack on the Southern position. South made a counter attack on the right of North at Achern which failed, as no artillery fire had been directed on that place. Cease fire then sounded.

The prompt way in which Colonel von Hochwachter, who was acting in his own country, gave up his line of communications and took up a flanking position to the advance of the North, whence he threatened the communications of the latter, seemed worthy of all praise. So long as he was there, North could neither proceed to his set task of blocking the road by Achern to Kappelrodeck and Freudenstadt, nor could he advance to Oberkirch, his second objective, without risking his communications.

He therefore had also to form front to a flank and exemplified the dictum of Von Moltke, viz., "A flanking position is a position which is taken up near and parallel to the enemy's line of operation—a position which the enemy cannot pass without laying open his lines of communication—a position which he cannot attack without changing his front, thus getting his communications on his flank, a position where a victorious action and a pursuit divert him from his original object. At the same time we must consider of course that we also abandon our line of retreat. A flanking position therefore can only as a rule be taken up in our country, where a friendly hinterland exists on which we can live. That will be much more difficult in an enemy's country."

It was adjudged that the southern force had been driven back from its position.

The Northern Artillery remained throughout the action in their first position in front of Obersasbach, and it was pointed out that when the attack of the Infantry was developed it should have advanced to a second position at Michelbach. The first position was nearly 3,000 metres, the second would have been about 1,500 from the enemy's position.

The next manœuvre day was September 13th. The same general idea held good throughout.

The special idea for North which was commanded by General Karl von Hugo was:—

(1.) The enemy has to-day suffered very heavy losses.

(2.) In Bühl and the Bühlerthal the inhabitants are arming and assume a threatening demeanour. The Northern Commander therefore feels obliged to detach two battalions (10th and 14th Jägers) and a squadron of Dragoons (flagged) to Bühl.

The following report is received from an Officer's Patrol:—

Officer's Patrol, 1st squad Dragoons, 20. Seebach, 11. IX. 97.
12 a.m.

The road to Achern over the Ruhesteener Pass is clear of the enemy. Inhabitants coming from Oberthal say that no hostile troops are there,

(Sd.) H.
Prem. Lieut.

SOUTHERN FORCE.

109th and 110th Regiments, 8 Battalions Jägers.
Unter Offiziers School, Ettlingen, (½ Battalion).
2 Squadrons 20th Dragoons, 1 Squadron 14th Dragoons.
4 Field Batteries.
1 Section Field Telegraph.
½ Field Hospital Detachment.
Total, 7½ battalions, 3 squadrons, 4 batteries, &c.

In consequence the following orders were given by General von Hugo :—

H. Q. Achern. 12. 9. 97. 7 p.m.

(1.) The enemy having suffered severe losses has retreated; his main forces are at Ulm and Renchen.
(2.) I shall renew the attack on him to-day.
(3.) The force will rendezvous in rear of the outposts at 6,30 a.m. to-morrow on the left bank of the Acher west of Oberachern (its position will be pointed out). At 7 a.m. the advanced guard will move off, followed by the main body at a distance of 1,500 metres.
(4.) The cavalry of the advanced guard will reconnoitre towards the Rench-thal. Special precautions are to be taken to secure the left flank in the direction of the Oberkirch—Kappelrodeck road to the west.
(5.) The Unteroffiziers School, Ettlingen, will occupy the Mountain Pass in Waldulm to block the road from Oberkirch to Kappelrodeck.
(6.) The pioneer company and pontoon train will throw two bridges over the Acher, between Achern and Oberachern, which should be ready for the passage of all arms at 8 a.m. The section Field Telegraph Abtheilung will establish communication between Achern and Bühl, where the 10 and 14 Jäger battalions have been sent.
(7.) The Infantry of the right wing of the outposts will remain in its position on the height of Fautenbach to secure the right flank of the force, and during the advance of the latter the Infantry of the left flank of the outposts will assemble as soon as the advance commences, and will join the force.
(8.) The heavy baggage escorted by one company (supposed) will proceed to Ottersweier at 6 a.m. and await further orders between Ottersweier and Buhl.
(9.) I shall march at the head of the Mainbody.

(Sd.), Von Hugo.

An officer's patrol will proceed at 6 a.m. byKappelrodeck towards Oberkirch. A second officer's patrol will report itself to me at the place of rendevous at 6.30 a.m.

SPECIAL IDEA FOR SOUTH FOR 13. IX. 97.

(1.) The enemy has suffered considerable loss to-day.

(2.) An officer who has been sent to the front from headquarters brings the following report :—

O. C. 10th Jägers. Alexanderschanze on the Freudenstadt-Oppenau Road.

11. 9. 2 p.m.

"I shall reach Oberkirch this evening with two battalions of Jägers (10th and 14th), 2 batteries (1 Field, 1 Horse), where I shall report myself to the commander of the reinforced 56th Brigade.

(Sd.) H.
Oberst. lieutenant.
Commander General-Major Kuhlmay.

Troops: 25th and 111th Regiments, 4th, 10th, 14th Jägers.
4 Squadrons 14th Dragoons.
2 Field, 2 Horse Batteries.
3rd Company Pioniers.
½ Field Hospital Detachment.

The outposts will parade at 6.30 a.m. The Force will march at 7 a.m.

ORDERS.

H. Q. Stadelhofen, 12. 9. 97.
8 p.m.

(1.) The enemy has suffered heavy losses to-day. His outposts stand on the heights north of the line Mosbach-Sensbach. His bivouac fires are observed about Achern and Oberachern.

(2.) I shall to-morrow, as soon as the reinforcements arrive, resume the advance with the object of opening up the road leading out of the valley between Achern and Kappelrodeck.

(3.) The force will parade to-morrow at 6.45 a.m. north and south of Ulm under cover of the outposts. Their positions will be pointed out to the troops.

(4.) The heavy baggage will be collected at 6.30 a.m. west of Thiergarten, on both sides of the road to Ulm, where it will be parked till further orders are received.

(5.) From 6.30 a.m. I shall be with the main body of the outposts, where and when commanders will report themselves to me.

Dictated to the Orderlies.

(Sd.), Kuhlmay,
General-Major and Brigade Kommandeur.

I accompanied the Northern, General von Hugo's force, whose cavalry soon discovered that Mosbach was strongly held by the enemy's Jägers. The artillery was then sent to the front and took up a position on the high ground on the east of the Fautenbach, on both sides of the road, after a preparatory cannonade, which was not replied to by the enemy's guns, the advanced guard advanced to the assault and were adjudged to have carried the skirts of the village, but as they endeavoured at once to penetrate it without re-forming, and came upon the main body of the enemy's advanced guard, which was strongly posted at the top of the hill and by the church in the centre of the village, they were ordered to retire and were driven out of the village. In the meantime the enemy's full force had arrived, his artillery came into action on the high ground east of Mosbach, and his infantry were formed for attack; General von Hugo's whole force was now in position above the Fautenbach the two Artilleries being only about 1,700 yards apart. The enemy advanced to attack, and being in superior strength the Southern force was ordered to retire to a rearward position. General von Hugo ordered a counter-attack to facilitate his retirement, which was carried out in a masterly manner, the counter-attack delayed the enemy by obliging him to concentrate his forces for a time, but it would have cost the Southern force dearly. The latter's artillery went past the south of Oberachern to the Michelbach where a strong position was taken up, and under its fire the infantry took up its second position. The enemy's artillery advanced to the high ground over the Fautenbach, while his infantry steadily advanced and occupied Oberachern, which was but feebly held. It seemed that this village, which formed a strong post in advance of the position, was given up too soon; as when once held by the enemy, the position including that of the Artillery was under rifle fire of men under cover at about 1,000 metres or less. Some charges were made above the Fautenbach by General von Hugo's Cavalry to stop the enemy's advance, but the sacrifice was in vain.

After the engagement Colonel von Zastrow, who assumed command of the Southern Force which retreated through Sasbach, issued the following orders from his head-quarters at Ottersweier:—

Ottersweier, 13. IX. 97. 6 p.m.

(1.) The enemy has not pursued beyond Sasbach, his outpost line extends from Sandweg by Obersasbach to Sasbach. The main body of his outposts stands east of Achern on the high road. Freudenstadt is occupied by stronger forces of the enemy, who is reported not to be in Oppenau.

(2.) To-morrow, about 8.30 a.m., six companies of the regiment in Bühl will reach Ottersweier.

(3.) The main body will parade at their bivouacs at 7.15 a..m to-morrow, ready for action, their positions will be pointed out to them by the adjutants. The 110th Regiment and the Unteroffiziers School, east of Ottersweier, north of the high road; No. 1 Company 110th Regiment south of the high road; the Jäger Battalion left of the 109th Regiment on both sides of the road north-east of Ottersweier; the Artillery also north-east of Ottersweier on both sides of the road. (N.B.—In reality the artillery will be on the road, owing to the vineyards, &c., on both sides of it.) The Pionier Company with the 110th Regiment, the Cavalry in rear of the Jägers. The Pontoon train will be attached to the heavy baggage, which will be under the escort of 1 Unteroffizier and 10 Dragoons (imaginary) and which will be clear of its bivouac by 6 a.m. It will be parked temporarily at Steinbach. The Field telegraph will remain in Ottersweier. The Field Hospital Detachment will take post in rear of the Artillery.

(4.) The outposts will remain in their positions.

(5.) The 110th Regiment, assisted by the Pionier Company, will put the south side of Ottersweier in a state of defence, all trees and hedges which mask the range of fire therefrom are to be levelled (imaginary); the commanding officer of the Artillery is to be consulted as to this.

(6.) The Commanding Officer will be at the east exit of Otterswier, at the point where the road from Bühl reaches it.

Additional order for the Outposts.

Roads to Freudenstadt are to be watched during the night by Officer's Patrols.

Communicated in writing to Commanding Officers.

(Sd.), Von Zastrow.

SPECIAL IDEA FOR SOUTH FOR 14. IX. 97.

(1.) The enemy has lost severely to-day.

(2.) The following telegram has been received from Freudenstadt, 13. IX. 2 a.m.:—

"The troops are ready to advance to-day. The enemy is reported to be reinforced at Rastatt and to have pushed covering troops to Rothenfels. I will to-morrow march on the Murghthal and endeavour to reach Raumunzach with the main body and Forbach with the advanced guard. A squadron, which is to reconnoitre the Ruhestetter Pass, will report to you to-morrow evening."

General-lieutenant.

(3.) Officer's patrols, which have been pushed forward on the roads in the Rhine-valley, report the neighbourhood of Sollingen free from the enemy. Inhabitants say, that beyond the troops known to be on the Bergstrasse, none of his force has advanced.

Leader of the Southern force, General-Major Kuhlmay.

Troops: Total, 9 Battalions, 4 Squadrons, 5 Batteries, &c.

General Kuhlmay therefore issued the following orders:—

Detachment Orders for 14. 9. 97.

Bivouac, Oberachern, 13. 9. 97. 8 p.m.

(1.) The enemy has retired by Obersasbach towards Bühl and has suffered severe losses, His outposts stand approximately on the line Sasbachried-Lindenhaus-Lauf. Our outposts watch the line passing from the railway through Sasbach to the mountains.

(2.) I intend to-morrow to continue my march on Bühl, and to attack the enemy again.

(3.) The head of the advanced guard will move off from its bivouac at 7.30 a.m. and will march by Achern and Sasbach on Bühl. Its cavalry, consisting of 2½ squadrons, 2 of which it will pick up as it advances, will reconnoitre by Sasbach, Haft and Sasbachried on Bühl, Moos and Lichtenau.

(4.) The main body, which during its advance will pick up the Jäger battalion, which has furnished the outposts, will follow at 1 kilom. distance.

(5.) The flanking detachment will assemble at Obersasbach on the left bank of the Sasbach will march at 7.50 a.m. in the direction of Lauf, Hub, Bühl, and will keep up communication with the advanced guard.

(6.) The heavy baggage will at first remain in its bivouacs, and at 7.30 a.m. will, on receipt of a special order to that effect, be collected north of Mosbach on both sides of the road to Oberachern, where it will be parked till further orders.

(7.) I shall be with the advanced guard.

(Sd.), Kuhlmay,
General-Major and Brigade Kommandeur.

ADVANCED GUARD.

Commander Oberst Lieut. Reichwald.
Nos. 2 and 3 Companies 111th Regiment
2½ Squadrons 14th Dragoons.
3rd Company Pioniers.

MAIN BODY AND ORDER OF MARCH.

¼ Squadron 14th Dragoons.
No. 1 Company 111th Regiment.
2 Horse and 3 Field Batteries.
25th Regiment.
4th Battalion Jägers.
1 Sec. Field Hospital

RIGHT FLANKING DETACHMENT.

Oberst Lieut.-Freiherr von Speigel.
10 and 14th Battalion Jägers.
5th Squadron 14th Dragoons.

The advanced guard of the Southern force advanced till it was checked by the fire of the infantry lining the south of Ottersweier, the artillery was then called up, but owing to a rise of ground called the Schuttenberg, it could not find a position and when it advanced on the west of Schuttenberg, it was received with such a heavy infantry fire from Ottersweier that half of it was put out of action and the other half ordered back; in the meantime the guns of the North opened fire from the high ground N.E. of Ottersweier, and must have played havoc with South's infantry advance. The flank detachment endeavoured to turn the left flank of North, but a battery slightly changed front to the left and fired at it, while the infantry of the defence on this side was superior to it in numbers.

The flank detachment had no Artillery with it, which appeared to be a mistake, as positions might have been found on the spurs of the hills, while in the direct advance there was not one. The Northern troops made a determined attack from the right of their position on the enemy, and it was adjudged that the attack of the South on Otterswcier failed, as must always be the case where a strongly held village is not at first subjected to a heavy and preponderating artillery fire.

Sasbach forcibly reminded me of Marshal Turenne, the great De La Tour d'Auvergne, who was born at Sedan in 1611, and after dazzling the world with his brilliant victories perished from a stray bullet in an insignificant skirmish at Sasbach, July 27, 1674, when fully prepared to crush his foe Montecuculli next day ; a monument is erected on a piece of ground which belongs to France, and is guarded jealously by an old French pensioner, and here rests "le premier Tacticien d' Europe" in the midst of Baden. His other memorial consists of a fine statue erected in the square at Sedan, whence two hundred years after his death, it looked upon the rapid crumbling away of the second empire of France under the iron hail from an encircling girdle of 540 German guns.

The 15th was a day of rest. On the 16th the Northern force retreated before the Southern, and a succession of rear guard actions were fought; in all cases the time of withdrawal was well timed, the commander of the former force in each case forcing his enemy to deploy and so gained time.

The troops went into close quarters in Oos and the surrounding villages, as very heavy rain fell, and the idea of bivouacs was abandoned.

On the evening of the 16th the Commander of the Southern force received information that a strong body of troops was arriving from the Murghthal to co-operate with him, which would be at Oberndorf at 6.20 a.m. and thence march on Kuppenheim, which was weakly held by the enemy. He was at 6 a.m. to press forward against Rastatt from the line Hugelsheim-Kartung. The Northern force has been reinforced from Rastatt, and directly the Southen force debouched from the Bannwald and attempted to advance beyond the Oos-Jffezheim road, the whole of the Artillery of the enemy came into action in front of the wood north of Sandweier, while the wood itself was lined with Infantry and it was clear that a serious stand was intended, the full strength of the Southern force being quite concealed owing to the wood. The Southern Artillery found an excellent position north of the Bannwald where the guns were completely concealed, while the Northern guns were in the open and close to the wood. The position of the latter, as was pointed out at once, was faulty. Not that they could have avoided going into action in the open, for the terrain was quite flat, but their position close to an object such as the edge of a wood, which was clearly defined on a map, at once enabled the enemy's artillery to find his distance from them and the range.

The Southern Artillery having been decided to have gained the ascendancy, an infantry attack in two lines was made on the wood, the Artillery coming to a closer range and firing at the Infantry holding the wood. It may be presumed that the Southern guns had subdued the fire of the Northern, and that, covered by their own fire the Infantry could have advanced as they did across the open, otherwise their losses would have been appalling.

On the next and last day of the manœuvres General von Grone commanding his division against a "Markirte Feind" under the following general idea:—

A Western army has crossed the Rhine at Plittersdorf and Maxau. An Eastern army is marching on the Rhine by the Murghthal.

Special Idea for the Eastern Force.

About noon on the 17th September the Eastern (14th) Army Corps is situated as follows:—

28th Infantry Division:

Main body Gaggenau and neighbouring villages. Main body of advanced guard Rothenfels, no portion of the outposts beyond the line Oberndorf-Oberweier.

No. 1 Abtheilung Corps Artillery at Ottenau and Horden.

29th Infantry Division (supposed) at Gernsbach, Obertsroth and Weisenbach.

Here also the rest of the Corps Artillery.

28th Cavalry Division at Gausbach and Forbach.

No. 1 Staffel (line) of Ammunition Columns and trains at Raumunzach.

No. 2 Staffel (do.) at Reichenbach.

The troops are to bivouac where quarters sufficient do not exist in the appointed places.

The above gives a fair example of the distribution of an Army Corps when in the vicinity of an enemy.

The following Army Corps orders were issued for the 18th September.

Corps Head Quarters, Gernsbach, 17. 9. 97. 6 p.m,
Army Corps Orders for the 18th December.

(1.) The advanced troops of the enemy who crossed the Rhine to-day at Plittersdorf have marched on Rastatt and Oetnigheim. From both places detachments have been pushed forward towards Bischweier and Niederweier, whose position in the vicinity has been reported by the outposts of the 28th Division.

(2.) The Army Corps will continue its march to-morrow down the Murghthal.

(3.) The advanced Guard will clear the Debouché from the Murghthal for the advance of the main body, and for this purpose will cross the outpost line with its foremost troops at 6.30 a.m. It is of the highest importance that the left flank of the enemy should be reconnoitred, as well as Maxau.

(4.) The main body will follow the advanced guard, its head marching from Gernsbach at 7.30 a.m.

(5.) The heavy baggage of the advanced guard will be parked at Rothenfels and Gaggenau on the left bank of the Murgh. The heavy baggage of the main body will follow the latter at first as far as Gaggenau.

(6.) The first line of columns and trains will march to Waisenbach, the second to Raumunzach.

(7.) I shall be with the 29. Infantry Division.

(Sd.), Von Bülow,
General Commanding.

Special Idea for the Western Force.

(Markirte Feind.)

On the 17th September the 1st Army Corps began its crossing of the Rhine at Plittersdorf in the course of the morning, but the 2nd Army Corps only began its crossing late in the afternoon. The latter merely pushed forward a weak advanced guard as far as Knielingen, while the 1st Army Corps as soon as its crossing was completed, advanced the 1st Infantry Division on Rastatt and Oetingheim, in order to oppose the Debouché from the Murghthal of the enemy, reported to be marching down the Valley.

The Commander of the 1st Infantry Division (12 battalions, 4 squadrons, 6 batteries) halted, at 12 noon, the troops which had been on the march since day-break, and ordered the right column to bivouac about the Memorial stone of the 25th Regiment, north east of Rastatt, and the left at Muggensturm Railway Station. Both columns are of equal strength, viz., 6 battalions, 2 squadrons, 3 batteries.

At one o'clock, the following troops were pushed forward as outposts from the respective columns.

From the right column. No. 4 Jäger battallion and No. 1 Squadron 20th Dragoons on the Memorial stone—Rauenthal-Bischweier-Road.

From the left column. Jäger battallion No. 8 and No. 2 Squadron 20th Dragoons on the road Muggensturm Railway Station—Muggensturm-Niederweier.

The foremost bodies i.e. the vedettes of the outposts are not to advance beyond the line Kuppenheim Railway Station—Margarethau Kapelle, Muggensturm, but the Murghthal is to be reconnoitred by patrols.

At 5 p.m. the Commander of the 1st Infantry Division receives the following telegram:—

H.Q. 1st Army Corps, Selz. 17.9. 4 p.m.

"The crossing is more and more retarded and the 1st Division can hardly count upon any considerable support before noon to-morrow."

(Sd.) General Commanding.

Operations to begin to-morrow 18.9. at 5-30 a.m., but patrols may be sent forward as would be the case in war; and earthworks may be thrown up from this hour.

(Sd.), Von Bülow,
General Commanding.

The following orders were issued by General Von Grone from his Head-quarters at Rothenfels a lovely spot some little distance up the Murghthal.

Divisional Orders.

Rothenfels, 17. 9. 12 noon.

(1.) The forces of the enemy which crossed the Rhine have advanced on Rastatt and Oetingheim, and have pushed forward detachments towards Niederweier and Bischweier.

(2.) The Division will halt. The main body will go into bivouacs in Gaggenau and neighbouring villages under orders of General Major Konrad Von Hugo.

(3.) The advanced troops will halt at Rothenfels, its foremost posts will be on the line Oberweier-Oberndorf. The country through Walprechtsweier in the direction of Muggensturm—Muggensturm Railway Station will be reconnoitred also that by Bischweier towards Rauenthal and by Kuppenheim on Rastatt.

(4.) Nos. 3, 4, 5, Squadrons of the 14th Dragoons will bivouac at Tirolsheim and Moosbrunn. Patrols will be sent towards Malsch, and during the night along the Chaussée Neu Malsch-Ettlingen, by Neu Malsch on Durmersheim, and through the Hardt-Wald towards the Rhine crossing at Maxau.

(5.) ¼ No. 1 Squadron will bivouac at "Hütte" north east of Ebersteinburg, and will reconnoitre towards Kuppenheim and Haueneberstein.

(6.) The divisional telegraph detachment will establish connection between the main body and the outposts, with the Commander of the advanced portion of the Division, and with the Divisional Head-quarters.

(7.) The heavy baggage &c., will join the troops.

(8.) I shall take up quarters in Rothenfels where further orders will be issued.

(Sd.), Von Grone,
Lieut.-General and Divisional Commander.

Divisional Orders.

Rothenfels, 17.9.97. 7.30 p.m.

(1.) The enemy who has advanced from Plittersdorf has placed Cavalry outposts on the line Kuppenheim-Wood east of Muggensturm.

His Infantry outposts are at Rauenthal and Muggensturm.

His bivouacs are at Muggensturm Railway Station and the Memorial Stone.

(2.) I shall attack the enemy to-morrow.

(3.) The advanced body will march from the junction of the Railway at Rothenfels-Kuppenheim at 6 a.m., and proceed by the Rothenfels-Bischweier Road on Muggensturm. The country will be reconnoitred by Oberweier-Muggensturm in the direction of Oetingheim, by Rauenthal towards Rheinau and by Kuppenheim-Rastatt towards Plittersdorf.

KARTE

zu den

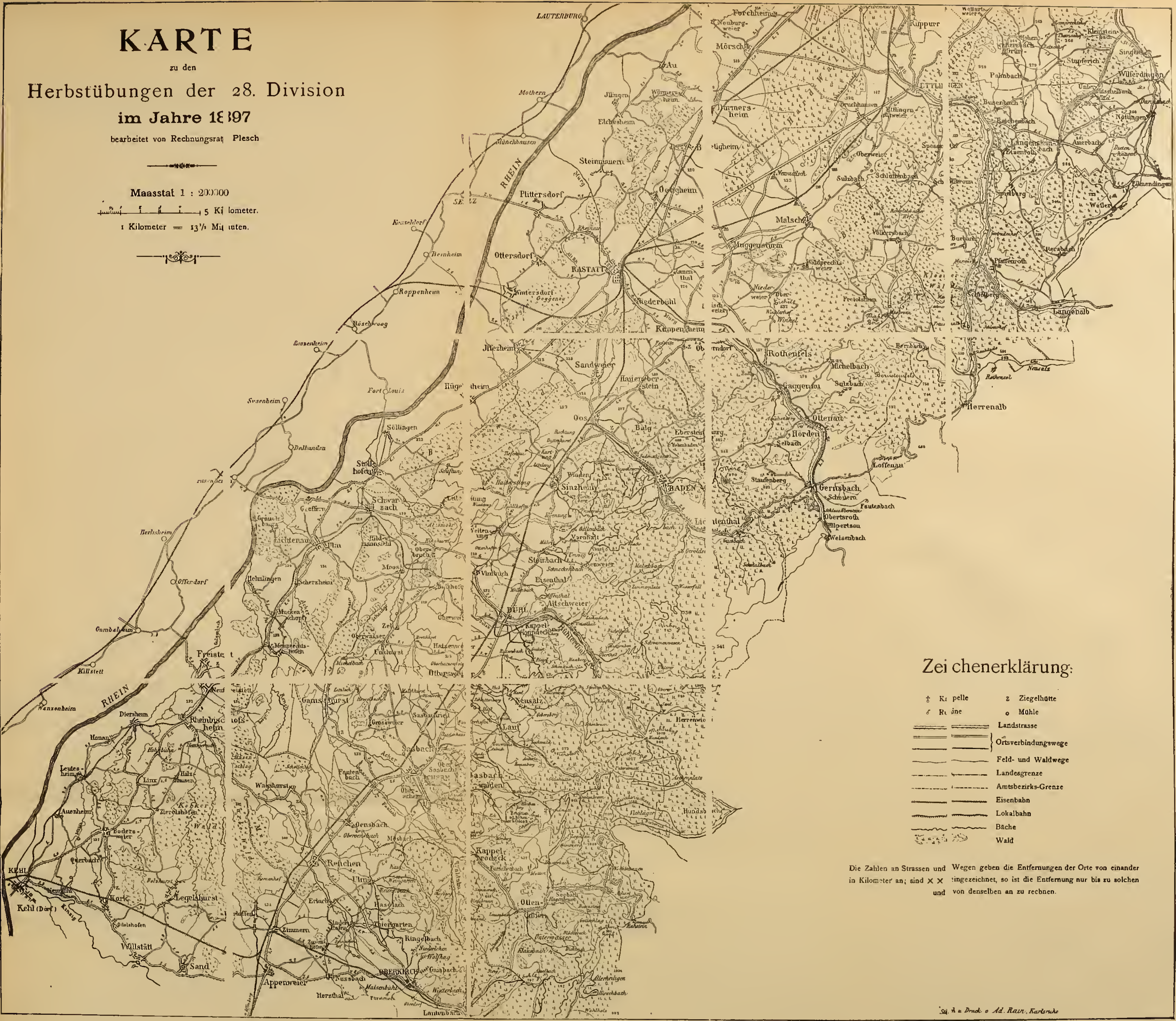
Herbstübungen der 28. Division
im Jahre 1897

bearbeitet von Rechnungsrat Plesch

Maasstab 1 : 200000

5 Kilometer.

1 Kilometer = 13⅓ Minuten.



Zeichenerklärung:

- ✝ Kapelle
- δ Ruine
- z Ziegelhütte
- o Mühle
- Landstrasse
- Ortsverbindungswege
- Feld- und Waldwege
- Landesgrenze
- Amtsbezirks-Grenze
- Eisenbahn
- Lokalbahn
- Bäche
- Wald

Die Zahlen an Strassen und Wegen geben die Entfernungen der Orte von einander in Kilometer an; sind × × eingezeichnet, so ist die Entfernung nur bis zu solchen und von denselben an zu rechnen.

Sd. u. Druck v. Ad. Rain, Karlsruhe

KARTE

[illegible]

[illegible]

im Jahre [illegible]

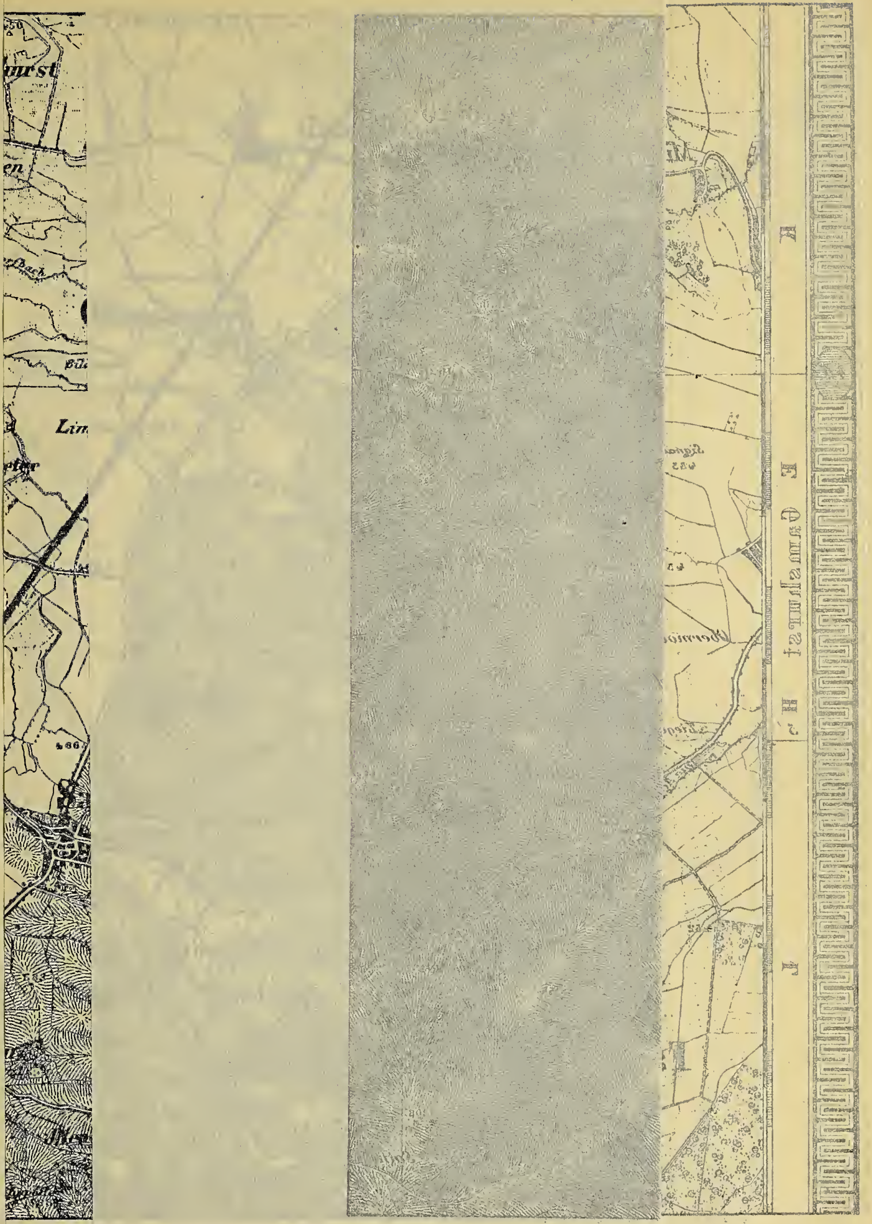
[illegible]

[illegible]

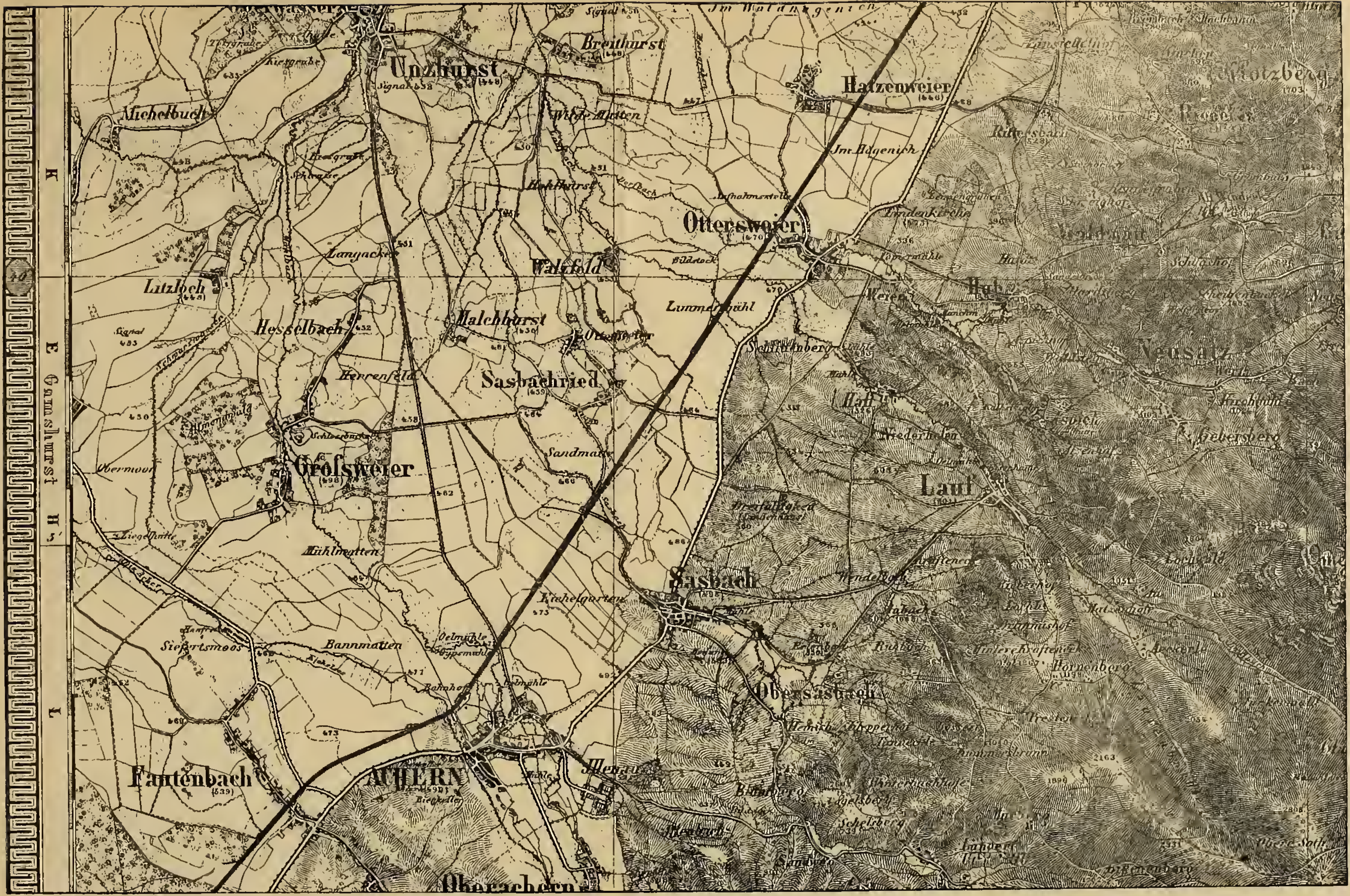
[illegible]

[illegible]

[illegible]



MANŒUVRES



GERMAN MANŒUVRES.

GERMAN

(4.) The main body will follow at a distance of 1,500 metres.

(5.) The right Flanking Detachment will march at 6.15 a.m. from Freiolsheim, and will cover the right flank of the advance by Malsch, it will look out for the portion of the enemy's force which has crossed the Rhine at Maxau.

(6.) The ¼ of No. 1 Squadron 14th Dragoons will march at 6 a.m., from "Hutte" by Ebersteinburg on Favorite, and will reconnoitre towards Rastatt and the cross-roads east of Jffezheim.

(7.) The heavy baggage of the advanced troops will be parked at 5 a.m. at the Rothenthal Baths, that of the main body under directions of General Major Konrad Von Hugo will be parked at 4.30 a.m. South of the "Glashütte" Gaggenau.

(8.) I shall be with the advanced portion of the troops.

(Sd.), Von Grone,
Lieut.-General, &c.

DISTRIBUTION OF THE TROOPS.

Advanced troops, Lieut.-Colonel Von Spiegel.
Total 2½ battalions, 1 Squadron.

MAIN BODY (ORDER OF MARCH).

¾ No. 1 Squadron 14th Dragoons.
Infantry Regiment.
Regiment Divisional Artillery.
1 Abtheilung Corps Artillery.
Infantry Regiment 111.
55 Infantry Brigade (109 and 110 Regiments).
No. 3 Pionier Company.
Bridge Train.
Divisional Telegraph Det.
Field Hospital Det.
Total 12 Battalions, ¾ Squadron, 9 Batteries.

RIGHT FLANKING DETACHMENT.

Lieut.-Colonel Freiherr von Roeder.
3 Squadrons 14th Dragoons.

LEFT FLANKING DETACHMENT.

¼ No. 1 Squadron 14th Dragoons.

Total 14½ Battalions, 5 Squadrons, 9 Batteries, &c.

The skeleton enemy was thus denoted—

A Company of Infantry by a red flag.
A Squadron of Cavalry by a white flag.
2 guns with a yellow flag marked a battery, full distances and intervals were kept.

The advanced guard of the Eastern Force came upon the left column of the enemy at Bischweier, all available artillery was brought up and came into action on the road to Winkelhof, and on the infantry advancing to attack, the enemy retreated to Muggensturm, where his two columns united, and prepared for a stubborn defence. General Von Grone then advanced to attack the place doing so in front with all his artillery and left brigade, while his right brigade marched to the North round Muggensturm to threaten the enemy's line of communications and retreat; the guns took up a position on the left of the Wood and between the roads leading from Muggensturm to Bischweier and Kuppenheim, while the left brigade were massed in the Wood. After a preparatory cannonade and when the right brigade was reported to have approached the road from Muggensturm to Neumalsch, a frontal attack in two lines was made by the left brigade on the Kapelle, which formed an advanced post and Muggensturm; and when the assault was about to take place cease fire sounded, and the manœuvres of the 28th Division came to an end. The next day, September 19th, I joined the 29th division at Mulheim; for the last two days of its work.

I have given in detail the manœuvres of the 28th division, to show the work which a division acting by itself in the German Army, performs.

I have given the general and special ideas and the orders in extenso as they were remarkably good throughout and form a useful study.

General Observations.

Infantry.

I had the opportunity of seeing one of the new regiments lately formed out of the fourth battalion, and I am able to say that there was no perceptible difference between it and the other regiments. In whatever part of Germany one goes to see the troops, one finds in one place, as it were, counterparts of units, which one sees in others.

The system is so perfect and the inspections so admirable and like clock-work, that although the freest possible hand is given to all Commanders of Units as to the manner in which their training is conducted, the result is required to be and is identical.

There is no centralisation, red tape, nor unnecessary interference with subordinate commanders, no piles of returns nor huge amount of correspondence.

The marching powers of the men, with their burdens of 63 lbs. are all that a commander could desire. In fact the infantry are trained pedestrians, which is accomplished, not by occasionally subjecting them to long marches, but a steady progressive system, as progressive as a course of gymnastics. Their boots, Wellingtons, into which their trousers are inserted for marching and drills, are most carefully fitted and constantly inspected as are their feet. They are allowed to wear either stockings or pieces of linen (Fusslappen) rolled round the foot but the vast majority prefer the former.

I saw no men fall out, which the coolness of the weather no doubt partially accounted for. Some of the marches were very long, twenty miles and more, and this added to a day's manœuvring, formed a good test of the fitness of the men.

The stature of the Baden troops is good, the standard is only

5 feet 1 for Infantry, but I saw very few so short as that, while they were all sturdy and fully up to chest measurement, there is no necessity to take " specials " and a short man with a good developement is as good as a giant for military purpose. The strength of the battalions on higher establishment is 660, on lower 596. The allowance of blank ammunition for the manœuvers 60 rounds per man. The fire discipline of the Infantry struck me as being admirable, and I most carefully watched it, I saw no hurried firing, and in every case the Commanders of units down to the smallest, paid the closest attention to fire control.

Every man carried a portion of a tent and two light poles (sticks). Every fifth man carried a spade, and shelter trenches in the defence were freely made.

CAVALRY.

One of the four regiments of Dragoons which form the Cavalry Division of the XIV Army Corps was at the Imperial Manœuvres; so that the force of this arm which I saw was very small and its action resolved itself almost entirely into scouting and out-post duties. The reconnoitring was very thoroughly done, and I was much struck by the intelligence displayed by the troopers who brought messages to General Von Grone with whom I rode throughout. When an Orderly arrived he shouted out the General's name, and when he was answered he approached and delivered his message. I often heard the General question these troopers, and most of them gave very intelligent replies, showing that they had exerted their powers of observation and they gave as a rule a very clear account of all they had seen and heard. I see every year an improvement in the German Cavalry in this respect, which speaks volumes as to the excellence of its officers, who are certainly equal to any in the army. The cloak is carried behind the saddle, and the corn bag beneath, while two large wallets which carry among other things the soldier's canvas frock and trousers are as with us, in front.

ARTILLERY.

There exists some doubt as to whether the German Artillery unlimber in the firing position or whether they do so in rear of it, and run the guns up by hand. I have been in corresponence upon this point with Colonel J. M. Grierson, Military Attaché at Berlin, than whom no one knows more of the German Army, and whose opinion on this as on all other points is most valuable. I have not attended Imperial or larger manœuvres than those of an Army Corps since 1880; so that I can only speak authoritatively as to the manœuvres of bodies not larger than an Army Corps. I have attended however manœuvres of the 14th, 15th and 16th Corps, and on every occasion when the ground favoured so doing, the guns were unlimbered in rear of the position and run up into it by hand, this did not lead to indirect firing which I have seen used once in the last three manœuvres I have attended, the limbers and teams were not exposed to the enemy's fire, and merely the gun and the men who ran it up were visible, and formed a very small mark, it will be allowed compared to that presented by a gun with limber and team. It is not only Artillery fire that has to be looked for on these occasions, but it is very hard to ensure safety against advanced parties of the enemies Infantry, who with the present long ranging rifle, can play destruction with the teams (the German says at 1500 yards), and if the horses are killed the mobility is gone. Much however as I advocate this method of coming into action when the ground is favourable to it, I must allow that the procedure is often impracticable, and that with large numbers of guns, such as those of an Army Corps or more, nearly always so, owing to the impossibility of finding favourable conditions of ground.

EXTRACT FROM A LETTER FROM A GERMAN ARTILLERY OFFICER STATIONED AT THE SCHOOL OF GUNNERY, JÜTERBOG, 10TH DECEMBER, 1896.

"With regard to your other question with reference to the method of coming into action, our rule is, that the guns are to be brought up to the firing position by means of the horses only so far as the latter are under cover from the fire of the enemy, and that when that can no longer be the case, the guns are unlimbered and run up by hand by the Detachments. This is invariably done when coming up into action against the enemy's artillery, already in position. If the latter is not the case, it is permissible to bring the guns up into the firing position without previously unlimbering. This, however, must be regarded as an exception to the rule. When, however, the fire of the enemy's artillery is nearly subdued, and when, in consequence, ours is not exposed to any great loss, when, moreover, we advance to a second or subsequent position to support the decisive infantry attack, then we bring up the guns into the firing position by means of the teams. This also is done in case of a pursuit, when it is all important to gain time. All these cases must, however, be regarded as exceptions to the rule, which is, that the horses are not to be exposed to the enemy's fire, and that the guns are to be unlimbered, under cover, and run up by hand by the gunners. The guns being unlimbered, the Nos. 1 run forward to the firing position, and select the exact site for their respective guns, which are then run up by hand to them.

"With regard to what you say you heard took place at the Kaiser Manœuvres this year, it was probably done in a case of pursuit, or in support of an infantry attack, in either of which cases the guns would have been brought up by the horses. In order, however, to fatigue the gunners as little as possible, the Battery Commanders are directed to reconnoitre the ground to their front most carefully, so that the batteries may advance under cover without unlimbering, as far as practicable, without being seen by the enemy; or in other words, that the distance over which the guns are run up by hand may be reduced to the utmost possible extent. This, of course, calls for a most carefull and searching reconnaissance on the part of the Battery Commanders.

„ In order to avoid observation from the enemy as long as possible, it is the custom in some Artillery Regiments to dismount the drivers, who lead the horses towards the firing positions as long as they can do so under cover; when this is no longer possible, the guns are unlimbered and run up by the gunners."

It is laid down in the German and New French Drill books that this method of creeping into position (Einschleichen in Feuerstellung) is to be adopted as far as possible. The German Army is however governed by principles and not by hard and fast rules, which amasculate the minds and restrict the initiative and enterprise of the majority of men, who do not eagerly grasp the responsibility of riding through rules when occasion requires it.

The greatest care was always taken to keep the limbers and teams under cover, under all circumstances, which was in marked contrast to the procedure of the Artillery at our manœuvres in Sussex.

One cannot help having a very high opinion of the two regiments of Artillery of the XIV Army Corps, viz., the 14th and 30th.

They are both commanded by singularly good officers, Colonel von Oppen and Colonel von Schubert, and in spite of the term of only two years service in all but the two Horse Artillery batteries, I should say that all the Field Batteries of the XIV Corps are fully equal to what ours now are, since drafts for the batteries abroad have been taken from them. The ground was very hilly and generally very deep, and the driving was particularly steady and good which has not always been the case in Germany.

As to the effect allowed to artillery fire at manœuvres, which is always a difficulty except when guns are engaging guns, I could not see that it was taken into account more than it is with us or in France.

A double prismatic telescope of really extraordinary power was on trial in a battery of Horse Artillery. The stand was carried by one gunner and the glass by another.

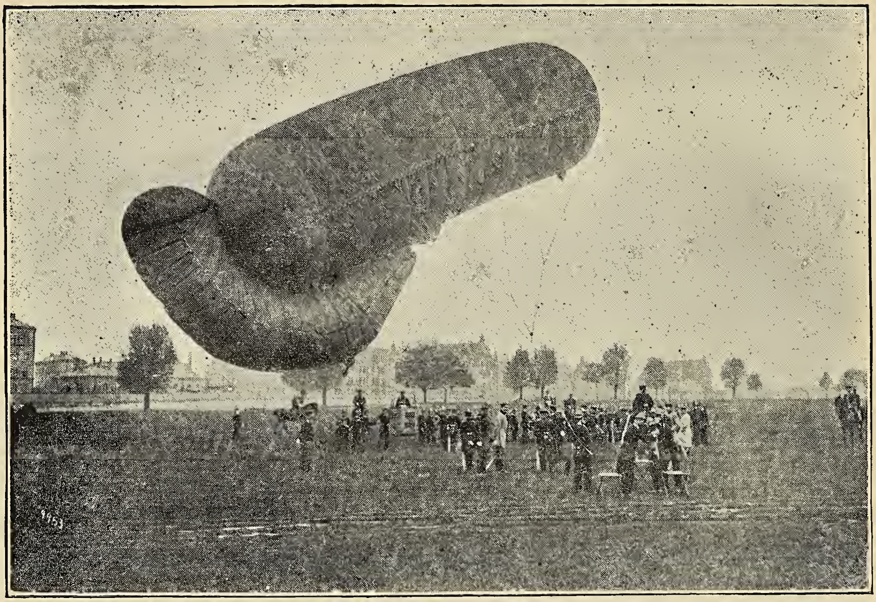
CONFERENCE.

The conference to which I was always admitted was held day by day; they were exhaustive and instructive, especially the general survey of the proceedings by General von Grone or General von Bülow, when he was present. Great care is taken to avoid censuring officers at them, if such is necessary it is meted out afterwards and without publicity. If the umpire in chief does not approve of the method adopted in any operation, he contents himself by giving his opinion as to how it ought to have been done.

MILITARY BALLOON.

Though I did not actually see the present Military Baloon (Drachenballon) used at manœuvres, I should like to mention it here. It possesses the great advantage of remaining steady in the strongest wind while the ordinary spherical balloon (Kugel-ballon) sways in a high wind to such a degree that very often it is impossible to take observations from it. The kite balloon (Drachen-ballon) is used with great success, both at sea and land manœuvres, and would be far better for us in my opinion than anything of the kind which we possess.

PHOTOGRAPH OF MILITARY BALLOON (DRACHEN-BALLON).



UNIFORM.

The uniform of the German soldier is remarkably serviceable and simple; with the exception of the canvas frock and trousers for rough work, he has only a tunic (Waffenrock) and cloth trousers or pantaloons. His dress is not subject to constant changes and experiments, and with the exception of a grey coat his dress (both officer and man) is practically the same as that worn fifty years ago. The clothing is made regimentally and there is centralised establishment of Army clothing.

With every company is kept the following suits:—

(1). Field uniform (Kriegs-garnitur) which is perfectly new and is only issued on mobilization.

(2). (Parade-Garnitur). Parade uniform for great parades, guards of honour, etc.

(3). Sunday uniform (Sonntag's Garnitur) for Sundays, holidays and ordinary reviews.

These three are kept for the company on peace establishment.

New suits of clothing are kept in the battalion store for all reserve men who would be called up on mobilization.

New and complete clothing, etc. is kept for the reserve men who would form the depôt in case of war, and of the Landwehr affiliated to the regiment, in the regimental store.

The soldier has besides two complete suits with him.

(1). Dienst-Garnitur or duty uniform which he wears on all parades and duties.
(2). Haus-Garnitur, which is only worn inside barracks for fatigues, etc.

Thus every German soldier has with him or in store five complete sets of uniform.

I visited stores of all descriptions.

THE DEFENCE.

In the defence, I noticed that the front line has become very thin, not more, perhaps, than one man to the yard, or even two men to three yards. As strong reserves as possible are kept in rear of the portion or portions of the positions likely to be attacked, while invariably a counter attack is prepared nearly always in a flank, so as to take the enemy in flank by massing troops under cover accordingly.

The Artillery of the defence is, I think, placed more forward and brought into action sooner than formerly.

THE ATTACK.

I saw no change in the system of the attack in the method so often seen and described by me. That is the front of the enemy's position is occupied by about a third of the attacking force and most of the Artillery, while two-thirds operate against a flank. Frontal and flank attack is, I may say, invariably combined, prepared by a long preparatory Artillery fire. The infantry always advance in two lines.

In the normal attack on Muggensturm, which I described, the first line advanced with its firing line extended in single rank at one pace, 250 to 300 yards in rear came the supports also extended, and about 500 yards again in rear came the second line consisting of battalions in line at wide intervals. Firing commenced at about 800 yards, when the supports reinforced when the first line advanced rapidily to about 450 yards from the village, lay down, and poured in a heavy and sustained fire, under cover of which the second line dissolved into swarms rushed forward to the assualt. The artillery which was particularly well handled thisday, advanced to within 700 yards of the village to sustain the assault, the enemy's artillery fire having been subdued.

I must again acknowledge the excessive and thoughtful kindness which was invariably shown to me by General Von Bülow, General Von Grone, and every officer with whom I came into contact. I was provided with a horse and two soldier servants; the ideas general and special and the orders issued on both sides were sent to me daily, billets were drawn for me, and I was treated in every way as one of themselves. From the moment I joined the Corps, I felt myself as much at home, as I could do in the army to which I have the honour to belong.

THE SERVICES

OF

LIEUT.-COLONEL FRANCIS DOWNMAN, R.A.,

IN

FRANCE, NORTH AMERICA, AND THE WEST INDIES BETWEEN THE YEARS 1758 AND 1784.

EDITED BY

COLONEL F. A. WHINYATES, *late* R.H.A.

LIBRARY
U. MAY 20 1898 S.
PATENT OFFICE.

CHAPTER III.

The attack and capture of Mud Island. The rebels abandon Red Bank Various expeditions. La Fayette's affair at Barren Hill. The Mischianza. Captain Downman leaves the army through illness and goes to New York.

October 31st, 1777.—We are now making two floating batteries up the Schuylkill intending to act against the fort. This should have been done a month ago, but as in everything else we act like snails. We have no spunk; neither life nor spirits appears in anything we do. By our delays and trifling attempts we point out to the rebels where their works are deficient and give them time to complete them.

November 2nd, 1777.—Things are pretty quiet except a little popping at the ferry on the Schuylkill between our advanced troops and some rebels on the other side. Six 24-prs. are come to Province Island from the *Eagle* man-of-war to make a battery against the fort which will be set about directly. A few cannon shot were fired by our ships at the rebel galleys this evening.

November 3rd.—I rode down to Province Island; things seem to be preparing for a little fun. Our ships are nearer the *chevaux-de-frise* than usual. Two floating batteries for 32-prs. are in forwardness, and fascines and planks are ready for the batteries. The rebel shipping moved a little lower down towards Red Bank to-day. Lord Howe intends fitting out two or three vessels with large guns to act with the others now making ready. Less than a week will determine who is to be master of the river Delaware.

NOTE. In the last number of the Downman Memoir at page 170, line 25 from top, after the words "New York", a space has been omitted through a mistake in printing, which should there separate the text of the memoir from the editorial comments on the campaign which follow.

November 4th.—I went down this morning to the 12-pr. battery on this side the Schuylkill, and observed the rebel shipping were in reach. I fire four shot, one of which went into the provision ship, and the others went so near them that they immediately quitted their station and went more over to the Jersey shore and higher up towards Gloucester Point.

November 5th.—I went this day at 1 o'clock to relieve Captain Scott on Province Island. I found the six 24-prs. drawn up to Blakney house. As soon as it was dark, so that we could work with safety, we began to repair the road down to the battery for the guns. Several rounds of round and grape shot were fired at us from the fort without doing any damage. This afternoon about 5 o'clock all the rebel galleys drew up in form, and went down and began a very heavy fire at our two uppermost men-of-war. They continued near an hour firing, but at such a distance that they did little or no execution. Two or three of the galleys felt more bold than the rest and ventured pretty near the men-of-war that had not yet returned one single shot, but when he saw them at a tolerable distance John Bull began to speak to them in so rough a tone that they tacked about and made the best of their way back after expending a great quantity of ammunition. The attack was very beautiful, the evening was fine and a dead calm, the galleys rowed down in two divisions, and though the smoke had a great effect their fire was incessant The rebels opened a two-gun battery on the Jersey shore to-day and fired several shots at our men-of-war, but John Bull did not care a fig for them and lay immovable as a rock. The day is not far off that we shall repay them with very great interest for all their incivilities. General Howe visited all the batteries on Province Island to-day, and has given directions to repair those that want it, and to push on the 24-pr. battery with all haste. Its situation is on the right of the left hand howitzer battery and nearly opposite to the centre of the fort on Mud Island. I attempted to get down the 24-prs. to the battery, but the night turned out so bad, dark and rainy, that, after trying from 6 in the evening till 2 in the morning, I was obliged to desist.

November 6th.—I was relieved this afternoon by Captain Adye.[1]

November 7th.—This day Captains Traille, Standish, Stewart, and Huddlestone with three subs and 160 men were ordered down to Province Island, there to remain till further orders. They are to get the 24-prs. on the battery and see everything in readiness and order for the day of opening.

November 8th.—This morning I went down to the island. The 24-prs. not yet ready. The rebels seem very busy in their fort.

November 9th.—Two 32-prs. were got to the battery near the Pest House. The 12-prs. were drawn off. These guns began a fire on the fort on Mud Island, and by their situation very much damaged it and annoyed the rebels. I got down from town an 18-pr. and placed it near the 12pr. battery on this side the Schuylkill to disturb the rebel shipping that lie at anchor off that point.

---

[1] Kane's List No 308. Captain S. P. Adye, Brigade-Major to Colonel Pattison, R.A. He afterwards was appointed Judge Advocate General to the Army.

November 10th.—This morning the 24-pr. battery and all the other batteries on Province Island opened upon the fort and kept it up the whole day. The rebel fire damaged our works and killed two men. Before evening their barracks, blockhouses, and other work appeared in a tattered condition, and one of their batteries was silenced. Two brigs and two sloops with provisions from our fleet passed the fort in the night and got up the Schuylkill without any loss, though the fort fired both cannon and small arms at them.

November 11th.—As soon as daylight appeared our batteries began again, and in a short time silenced one of the rebel batteries. A few men were wounded to-day. By my application a battery was made this evening for a gun on the wharf about half way between the Pest House and our batteries. It was made and a medium 12-pr. got on by the morning. The gun by situation flanks the rebel works, and of course must much annoy them. It also commands a wharf opposite to it on Mud Island and prevents the enemy from coming down to fire on our boats that pass and repass every night with provisions and ammunition.

November 12th.—The firing from our batteries in a small degree kept up during the night and pushed on with vigour when day appears. Our men-of-war are approaching nearer the *chevavx-de-frise.* The *Vigilant* is to come up as soon as the tide will admit her. She is not to come over or through any part of *chevaux-de-frise,* but up a creek between Province Island and another small isle. Her station is to be on the angle of the rebel grand battery and on the right of our batteries. A sloop, likewise, with three 18-prs. is to follow the *Vigilant,* and after she is moored the sloop is to anchor just ahead of her. The men-of-war are to approach as near the *chevaux-de-frise* as possible and to keep up a fire on the fort and prevent their galleys from falling on the *Vigilant.* The floating battery with two 32-prs. is to be stationed on the left of our batteries, and a detachment of the guards is to be in readiness to storm.

November 13th.—The wind blows exceeding hardly; the *Vigilant* cannot come up, nor the floating battery get down. Our batteries keep up a constant fire with cannon and mortars. The fort appears a perfect wreck; they return our fire but very faintly. The wind abated in the night. The floating battery went down and took her station.

November 14th.—This morning at daybreak the rebels discovered the floating battery and directed all the guns they could against it and in a very little time obliged the officer and men to quit her. The shot went through and through but fortunately they lost but one man. It was now proposed to take the guns out of her and put them on the wharf where I had made a battery. As soon as night came on, boats went down and towed her alongside the wharf, and one gun was taken out and put on the platform; the other remained in her.

November 15th.—In the morning early our batteries renewed their fire. The 32-prs. at my wharf annoyed their boats and galleys and did much damage to the fort. The morning is fine, the wind moderate and fair. Our men-of-war approach close to the *chevaux-de-frise*; all the rebel galleys go from Red Bank and attack them, but are obliged to retire. The ships, our batteries, all are pouring a constant and well-directed fire into the fort. The blockhouses are entirely demolished. Several explosions in the fort. They seem to be in the greatest distress and confusion. They have made signals for assistance. A number of boats go to them through our fire. About 12 o'clock the *Vigilant* appeared, instantly brought to in her station, and began to fire on the fort. The sloop drew up in her place and kept a constant fire. It was a glorious sight. On one side of the fort was to be seen a number of galleys, floating batteries and ships keeping a constant fire on our ships; on the other side, all our batteries, the *Vigilant* and sloop pouring in a tremendous fire on the fort, and from the men-of-war a no less vigorous fire was directed into the fort and at their galleys. At length, after firing on both sides without intermission the whole afternoon, the galleys, floating batteries and xebecs all moved away. The fort seemed to be totally in pieces; necessary orders were given to storm in the morning. Before dark six or seven of the rebel galleys rowed up towards the fort as if to attack our ships again, but we soon perceived that they had some other intention. They collected at the wharf on the other side Mud Island, and we concluded that they were either landing more troops or taking off those that were in the fort. They were in this situation about an hour, small boats also passing and repassing between the fort and Red Bank. Our cannon here did much execution in both galleys and boats for they were quite exposed. The fort at this time was totally silenced. The night brought on a cessation of firing, except now and then a few shot and shell from our battery. About 12 o'clock at night we were all surprised to see the fort in flames, and to all appearances every part of it seemed to be on fire. We now concluded the rebels had quitted it at the time the galleys were lying at the wharf, leaving only a small party to destroy it. It burnt very fiercely all night.

November 16th.—At break of day we discovered the rebel colours still flying and the fort almost totally destroyed but no appearance of any person. In a little time the *Vigilant* sent her boat well manned ashore; one of the jacks mounted the flagstaff, tore down the rebel and hoisted in their stead English colours. I got a boat and went over. One man was found upon the island who informed us that the rebels had suffered very much, losing about 50 men killed and between 70 and 80 wounded. The fort is strong and had it been stormed a very considerable loss would have been the consequence. Nothing that could add to its strength was left undone. The island is nothing but a marsh enclosed with a bank. They have cut ditches, they have made *trous de loup* and stuck a frise in every part outside the stockades, which are very high and put close together, loop holes being cut through these pickets from which they could pick off your men and you could not possibly hurt them. The fire had not consumed the whole buildings; two ranges of barracks was all that suffered from fire, but our shot had completely demolished every part of it. The blockhouses were knocked entirely to pieces, a great number of their guns and carriages were rendered useless by the shot they have received, in short it is in such a battered situation that it is past describing. In almost every place you see blood and brains dashed about, and hardly a spot in the whole place that has not a shot. The only cover the rebels had was outside the fort under a stone wall. Here it was I saw some of the guards (who had gone over under the command of Sir George Osborne) digging up or pulling out of the ditches the poor wretches that had been killed, most dismally torn and mangled by cannon shot, and stripping them of their shoes or whatever they had on them, and then dashing them into the holes again with as little concern or feeling as a butcher shows in killing or cutting up an ox. Their determination to quit the island has been precipitate for they left some of their guns loaded and unspiked, and a quantity of powder and ball and other stores. Twenty-eight cannon from 32prs. to 40prs. and ten other guns sunk in a boat near the wharf.

A battery for four 24-prs. began this morning intended to keep off the galleys from our ships while they are getting up the *chevaux-de-frise.* In the evening I went to town after being eight days upon Province Island, a volunteer, and going through a very great fatigue night and day. All that time I had not my clothes off, nor got more than an hour or two's sleep at a time. General Howe returned his thanks to the artillery on this occasion.

November 17th.—A report prevails that the reinforcement of 3,000 men, which arrived a little time ago in the river, are ordered to land on the Jersey shore and to march towards Red Bank, and that another strong detachment from here will land also and proceed to the same place. The junction of the parties will be the decisive stroke against that place, for the very idea of being surrounded is what they cannot bear. General Washington and his army are in or near Germantown, and their light horse and our advance pickets are daily skirmishing.

November 18th.—I went on command to Mud Island. I got two 18-prs. mounted on our new battery. Two 32-prs. are to be put on this battery also. The rebel vessels, except the galleys, are moved from Red Bank and gone near to Gloucester Point. The galleys this afternoon were in motion; we expected them down to the fort. The reinforcements from New York are landed on the Jersey's, and have been joined by a large detachment from our army; their intention is to invest Red Bank; Lord Cornwallis commands.

November 19th.—Early this morning I observed the galleys in motion and prepared everything to receive them, but instead of paying us a visit they went and joined the fleet at Gloucester Point; at the same time the rebel forces made a movement at Red Bank, and from everything we could discover such as ammunition waggons on the march, people carrying bundles, and boats being filled with barrels, we conclude they were evacuating the fort and works at Red Bank, which if true, our fleet may be before the town in a little time, as we cannot meet with any interruption in removing the impediments in the river. I was relieved this afternoon and went to town. A report prevails that the rebels have quitted Red Bank and intend destroying a number of their vessels. Wrote to Colonel James by Captain Layard.

November 20th.—This morning about 1 o'clock we were roused out of our beds. Some deserters from the rebel galleys had informed the General that all the galleys intended to be up at town about daylight to set fire to our frigate, the *Delaware,* and to cannonade the town. In a little time we were prepared to receive them, having manned and got our guns ready, but they did not come.

November 21st.—The rebels have abandoned Red Bank, have left 18 pieces of cannon, and blown up the magazine that contained a great quantity of powder. A vast quantity of shot and other stores were found in their works. Lord Cornwallis's army took possession and we are now destroying it. Mud Island is also to be destroyed and the cannon and stores brought to town. This evening the rebels set fire to their whole fleet, except the galleys which, under cover of a dark night stole past the town and went up the river. A brig and sloop attempted to pass, but they were prevented by our batteries and the frigate and ran aground just opposite the town, they were set fire to, and after burning a considerable time blew up. The loss of this fleet of 30 or 40 vessels, some of them considerable size, must be a heavy blow to them, as almost all of them had a great quantity of powder, guns, and stores on board. The explosion of some of these was so immense that the whole town was shook as with an earthquake. By the taking of Red Bank and Mud Island and the extinction of the fleet, the river is now entirely free, and our vessels are coming up to town every tide. The *chevaux-de-frise* will be instantly removed and in a few days our men-of-war will be before the town. General Pattison and John Williamson's[1] company are landed and are at Red Bank with the army. Our redoubts and lines round the city are finished and are very strong, so much so, that we need not be under the least apprehension of Mr. Washington's attack, though he threatens hard and some of his ragamuffins are firing at our pickets every foggy morning, but are always driven back with loss.

November 22nd.—The artillery are ordered to be in the redoubts every morning before daylight. Three hundred rebels made their appearance in front of our lines and attacked the outguards, but were driven off with the loss of seven killed and some wounded; not a man of ours was hurt.

November 23rd.—Our ships are coming up very fast and things remain pretty quiet; a little skirmishing indeed every morning between our pickets and the rebels.

November 24th.—Lord Cornwallis's army have destroyed the works at Red Bank, and are expected in town to-morrow or the next day. It is rumoured an attack will take place on Mr. Washington in a few days. Ammunition for all the field artillery is ordered to be put into waggons, and the works round the town are being completed with cannon and ammunition.

---

[1] Kane's List, No. 219.

November 25th.—General Pattison of the artillery arrived in town this morning. Williamson and his company are embarked in the *Lord Howe* and expected in town. They arrived the 26th. Everything remains pretty quiet about the town.

December 4th, 1777.—The army had orders to march this morning at 6 o'clock in two divisions, but during the night countermanded; everything has been pretty quiet.

December 5th.—The army marched this night towards Chesnut Hill. A severe illness prevented my being out with the army.

December 8th.—Nothing yet transpired about our army. It seems by report of deserters that General Gates has joined Washington with 5,000 men, and the whole are strongly posted at White Marsh, a little distance from Chesnut Hill. General Cleaveland and Major Farrington went this day for New York. I wrote to Colonel James by the latter. This morning about 8 o'clock the whole army returned without doing anything, except losing a few men, about 50. They found Washington in great force and strongly entrenched, and an *abattis* before him, upon a hill above White Marsh. Our general saw that they could not be forced without a great loss of men and without any material advantage attending it. A successful blow at this juncture against the rebels would be attended with perhaps no other circumstance than driving them a little further back, which would answer very little purpose, as all the forage both for man and beast is nearly gone for many miles round this place. He therefore very prudently retired after making several movements to induce the enemy to leave their stronghold, but they were too wise.

December 10th.—I made application for leave to go to New York for the recovery of my health, but General Howe would not grant it,—unkind, when I have got my illness by a fatiguing duty and cannot possibly do any this winter, and yet could not obtain an absence of only three months. He told General Pattison he was sorry I was ill and hoped I should be able to remain here, that I was a good officer, and that he had good reason to be satisfied with my behaviour. A little flum not amiss now and then. A foraging party of about 7,000 men under Lord Cornwallis went over the Schuylkill, they met with little opposition from the militia under General Potter and a part of Washington's army whom they drove across the river over their own bridge, and who destroyed it that they might not be pursued by us. As it was we killed a good number of them, took some prisoners and returned to town the next day without any loss and with 300 waggons full of forage. Lord Cornwallis and several officers are going to England. The 71st and the Mirbach regiments are going to New York. Lord Cornwallis went home in the *Brilliant* about the 16th of December.

December 22nd.—About 10,000 of the army under the command of General Howe marched by the left over the pontoon bridge at Gray's ferry. They extended themselves from two miles beyond Derby to the side of the Schuylkill and remained there without molestation, except a little popping, till the 28th December, when the whole returned and took up their usual quarters. They have collected a good deal of forage, which it seems was the only intent of the Commander-in-chief, though from his being with them it was imagined something else was at first thought of. Ten or twelve light dragoon were surrounded by the rebels through venturing too far into the country and were taken, and a few others were also captured in marauding. The snow and cold weather begins to set in pretty severely.

December 24th.—This evening about 6 o'clock the rebels brought down in the front of the 2nd redoubt two light field guns and fired a few shots at the town; our redoubts returned their fire and drove them off with great precipitation, for the rangers advanced almost immediately, but the scoundrels fled. Our lines were manned throughout and remained in readiness the whole night, but everything was quiet. What they could mean or intend by this trifling mischievous little spurt I cannot find out, unless one of their generals had laid a bet that he would fire a shot into the town in spite of our redoubts. The nights were very dark, the road hard and good, so that it was no very difficult matter for them to bring a light 3-pr., fire three or four shots and then gallop away again. It could answer no purpose except to knock on the head a woman or child, for the shots went far over the redoubts and nearly into the middle of the town. If they had meant an attack during the night or at daybreak they never would have been so imprudent as to fire a gun or give the least alarm till they were ready, as they must know that such proceedings must put us on our guard. I visited the different redoubts at 10 o'clock, and as everything appeared quiet, I went to my quarters fearful of getting a relapse of my disorder, as the night was very cold. Our army are still out foraging. We do not hear they have met with tho smallest interruption. A sentinel of the 40th regiment deserted from his post last night. He was stationed between the 5th and 6th redoubts; the countersign was ordered to be changed by the advanced pickets in consequence. We are informed by some country people who are coming in daily, that the ridiculous spurt of the rebels was quite a drunken frolic; it was proposed over night when drinking by some of their officers, but not without first being informed for a certainty that General Howe and his army were out foraging.

December 28th.—The frost is set in severely cold. The army returned from foraging. Many are surprised that it was merely employed in the work. The Commander-in-chief being with them has given room for these conjectures and remarks. Several of our small vessels, in coming up the Delaware or going down, have been driven ashore by the ice, and some have been taken with clothing and officer's baggage on board. The rebels ought to be very civil to us, for I am sure we are very tender and considerate with respect to them. We have dilly dallied and shilly shallied till the river is frozen up, by which means several of our ships have been caught, stripped of their cargo, and then set on fire.

January 4th, 1778.—It is only now that we have thought or at least done anything about laying in wood. A good large detachment is every day employed in cutting wood and bringing it to town. They bring it from the other side the floating bridge that is made over the Shuylkill between the 10th and 11th redoubts. Skirmishing every day between our light horse and the rebel horse. They lost a major and several officers killed, and 13 taken prisoners yesterday.

February 2nd.—Many deserters came in to-day. A colonel belonging to their army was seized by some of the cavalry people and brought a prisoner to town. The river is now entirely free from ice, and the weather is very fine.

February 6th.—Thirteen sergeants and a corporal of the rebel artillery came in to-day. An officer and many others deserted to us yesterday.

February 23rd.—The two regiments of dragoons made a long march into the country, and returned with 130 head of cattle and a number of prisoners.

February 24th.—In the night about 11 o'clock the two battalions of light bobs embarked in flat boats, went down the river, and landed at Billing's Port on the Jersey shore. It seems the General has received information of the rebel General Wane with a body of men under him being there or near collecting cattle etc. for the rebel army.

February 25th.—This night about 12 o'clock the 42nd regiment embarked in boats and crossed over to the Jerseys opposite the town. We imagine the intention is to make a junction with the light infantry and most likely by this manœuvre they may surround Mr. Wane and his cattle. It is reported with great confidence that the people of the Jerseys, finding themselves so torn to pieces with exorbitant fines and penalties laid on them by congress, have sent to assure General Howe that if he will send them some troops to support them, they will unanimously take up arms against their lawless masters. Should this be true it will be one of the most favourable circumstances that can attend us.

February 27th.—The light infantry returned without doing anything.

March 1st, 1778.—The 42nd returned after destroying 12 or 14 of the rebel vessels, and brought in some prisoners without any loss. General Wane made an attack on them in the evening, but they drove him off in an instant and pursued him a great way, but he ran too fast. The snow set in very severely and continued till the 6th with hard frost.

March 6th.—This morning the 1st light infantry and a party of dragoons marched from town beyond Chesnut Hill, surprised a party of the rebels and returned in the morning without loss, bringing 20 or 30 prisoners.

March 12th.—A number of ships and small craft went down the river to-day with the 17th, 27th, and 46th regiments, supposed for forage. Ten or twelve ships from Rhode Island came up town to-day with forage, very opportunely. The rebels have got at Wilmington Creek several galleys and other vessels with which they annoy ours very much. They have just now taken two of the Rhode Island fleet and destroyed them; they have also taken the *Alert* belonging to Captain Montresor, with several officers' wives and much baggage and valuable things on board. It is no honour to our navy or army that this nest of rebel vessels is suffered to do so much mischief. An attack both by land and water would be the means of effectually taking and destroying the whole.

March 14th.—A large ship from Ireland with recruits came up today. The weather for this three days past has been remarkably fine and so warm that fires are laid aside.

March 17th.—At night a party of light bobs aud dragoons went out about eight miles, surprised a rebel guard, killed four or five and brought in near 20 prisoners.

March 20th—A party of jägers and Philadelphia light horse went after a party of the rebels who had approached the Schuylkill to set fire to some barns. They came up with them, charged them, killed a captain and several officers and brought in 13 prisoners without losing a man. I was told to-day that not less than 1,600 rebels have deserted to us since we have been here, mostly Irish. We are informed that Mr. Washington is making a bridge of boats over the Susquehanna, near a mile in length. By this one would suppose his intention is to leave this part of the country and to return to Virginia, where we cannot easily get unless we again embark and proceed by the Chesapeake, and then perhaps he would tack about and return hither.

March 25th.—This day Major Williams[1] of Artillery, who was taken prisoner with General Burgoyne's army, came to town from New York through the Jerseys, accompanied by General Lee the rebel. It is imagined a general exchange of prisoners will soon take place.

March 27th.—The January packet arrived to-day from New York. I received a letter from Mrs. D., Miss Day, and Colonel James.

March 28th.—A number of vessels arrived to-day from England with recruits and provisions, last from New York. The lion is roused at last, all England is up in arms, every county is raising troops and the whole nation seems determined to prosecute the war and to crush this monster rebellion. It is a glorious ardour, every honest British heart bounds with joy to find his country so unanimous. When England is determined and unanimous who can beat her?

The three regiments that went down the river the other day returned the 28th, after collecting a great quantity of forage without any loss and disposing of a few of the rebels, i.e. bayoneting them and bringing some prisoners.

---

[1] Kane's List, No. 131. Major Griffith Williams sailed with his company iu the ordnance store ship *Charming Nancy* for the St. Laurence in March, 1776. There was published in "Notes and Queries" in November, 1897, the regulations drawn up by the officers on board for preserving harmony and decorum among themselves during the voyage. These regulations are both curious and amusing, but too long to quote here. The record is made by George Williams, a volunteer and nephew to Griffith Williams. He served with his uncle throughout Burgoyne's campaign and carried the flag of truce to General Gates on October 13th, 1777. After his reture home he entered Parliament and was member for Ashton-under-Lyne, and J.P. for Lancashire. Died 1805.

April 5th, 1778.—Information being received that a body of rebels, consisting of about 300 with two field pieces, were collected at Haddonfield on the Jerseys, a party of light bobs went down the river in boats and landed at Gloucester Point, from whence they marched to the above town, but the rebels being apprised of their danger very prudently withdrew, except six who fired out of a house, were stormed in their castle and bayoneted, and a rebel light horseman met with the same fate. On the return of our party they heard that about 40 of the rebels were lodged near Cooper's ferry, on which they directed their march to that spot in such a manner as to surround them, and after a short skirmish in which several were wounded, made 26 of them prisoners, amongst whom were a major and two subs. Our troops received not the least injury in their excursion. Our light troops are almost every night making excursions into the country, sometimes 20 miles and upwards, and as often return with 30, 40, or 50 prisoners, besides killing and wounding many without the least loss to themselves.

April 10th.—The February packet arrived from England, some vessels from Rhode Island and from New York.

April 14th.—The *Aldborough,* a new frigate, Captain Keppel, arrived here in 28 days from England. She brought dispatches for General Howe. Poor old England! and must you knock under to rebels at last?

April 22nd.—The light bobs made a dash near Chesnut Hill in the night, surprised a captain's guard of 80 rebels, killed some and brought in the lieutenant and 53 men without any loss. Lord Howe arrived from Rhode Island on April 16th. Two large redoubts are begun in front of the others and are being carried on with great expedition; they are situated upon the rising ground at the distance of 300 yards. This appears, I think, as if we intended to act upon the defensive.

April 30th.—This night a small party of the light bobs, dragoons, Queen's rangers, and a few Pennsylvania dragoons left this at about 11 o'clock and proceeded up the Old York road. About a mile beyond the Billet they fell in with Lacy's brigade of rebel militia consisting of about 500 men, and immediately attacked them. Lacy at first made some appearance of opposition, but in a few seconds his men were thrown into confusion, obliged to retreat with precipitation, and were pursued about four miles. They left between 80 and 100 dead on the spot, and yesterday between 50 and 60 prisoners, besides waggoners and 10 of their waggons laden with baggage, flour, salt, whiskey, etc., were brought in by our troops on their return. A good many of the rebels were wounded, but we cannot ascertain the number. The waggons were burnt with all their huts and what baggage could not be brought off. The loss on our side was seven men wounded and two horses killed.

May 2nd, 1778.—Two regiments are gone across the river to the Jerseys with some light cannon opposite the town. Redoubts are likewise going to be erected there.

May 4th.—Sir Henry Clinton arrived from New York. He is to take the command of this army, and General Howe is soon going to England. A number of vessels arrived also, some of them from England with provisions and recruits. We are just informed by dispatches from London that a French war was declared the 17th or 27th of March last. The French have entered into a treaty of amity and commerce with the rebel Americans.

May 7th.—This night three of our row galleys, an armed brig, and a schooner went up the river with a detachment of the 2nd light infantry on each side, and set fire to the *Washington* and *Effingham* frigates, a large ship pierced for 24 guns, a privateer sloop, nine ships, and 16 or 18 small vessels, all of which were consumed, also a quantity of naval stores, and some thousands of tent poles, pegs, etc. The house of Mr. Borden at Borden town, Mr. Kirkbright's and the ferry house were by some means set on fire and burnt to the ground. The troops and vessels returned on Sunday without losing a single man.

May 15th.—Our battering cannon is ordered on board ship immediately. Captain Farrington's company is ordered to Halifax.

May 19th.—This evening intelligence was received that the Marquis La Fayette with a large body of the rebel army had crossed the Schuylkill at the bridge lately built by them and was stealing a march to German town. A detachment of the British army was immediately ordered to meet them or to get between them and their bridge. This would have been effected, but, d—— your buts, but the officer who had the honour to command this detachment of the finest part of our army, after making a further detour than was necessary, made also a halt. Now, sir, you can see why I d——d the buts. General Grant made his *halt* very critically for it happened to be at the very time he ought to have advanced with all his speed. How fortunate is our most gracious sovereign to be blessed with such truly intrepid soldiers, and such consummate generals. D—— the buts, I wish he were drowned in a butt of Yankee cider.

The affair at Barren Hill is here referred to.

General Washington had sent La Fayette with 3,000 men across the Schuylkill to a position at Barren Hill, seven miles from his encampment at Valley Forge. Dispositions were made by General Howe to cut off this force. On the night of May 19th, General Grey with a strong detachment marched from Philadelphia along the western branch of the Schuylkill, and placed himself two or three miles in front of La Fayette's right flank, while the remainder of the British army advanced to Chestnut Hill. Meanwhile General Grant with 5,000 men had moved along the road close to the Delaware, and unperceived gained the rear of La Fayette's position and a point nearer to Matson's Ford, his only line of retreat, than Barren Hill. General Grant, however, instead of at once marching to the Ford hesitated, and after some delay advanced towards Barren Hill. La Fayette having by this time become aware of his danger hastened with all speed towards the Ford. Grant, on reaching the hill, discovered the enemy well on their way to the Ford and marched in pursuit, but it was too late and they escaped. It was a very badly managed affair. Had the advice of the Quarter-Master-General, Sir William Erskine, been taken, La Fayette could not have escaped.

On Monday the 18th a number of gentlemen of the army, possessed of more money than wisdom, gave an entertainment to Lord, and General Howe, General Clinton, etc., and the rebel · · · · of this town. The managers gave it the name of Mischianza. It consisted of a variety of matters, and I think might as well have been distinguished by the appellation of shamfontic or anything else. It was given, very *mal apropos,* just after we had heard the rebels to be supported by France and that a war with that nation was inevitable. The following is an account of it from first to last:—

The army, anxious to give Sir Wm. Howe a most publick and splendid testimony of the high esteem they entertain of him as a general, and of the affection and attachment which his popular conduct had secured to him from all ranks, both of officers and men, prepared a magnificent entertainment to grace his departure. It consisted of a variety of parts and was therefore called Mischianza. The admission tickets were decorated with a sun just verging to the horizon, with the inscription *Luceo discedens, aucto splendore resurgam.* On the lower part of the shield was the sea. At the top the general's crest with the words *Vive! Vale!,* and at bottom and all round different military trophies. The fête began at four o'clock in the afternoon, by a general grand procession on the river, consisting of three divisions—a galley and ten flat boats in each division. In the centre division was the *Hussar* galley with the General, Admiral, General Clinton and the ladies of their party. The flat boats, with bands in each, led the procession. They set out from Knight's wharf (so called for the occasion) at a signal from the *Vigilant,* and proceeded till they arrived at the market place, when the *Fanny,* armed ship, was drawn off into the stream beautifully decorated with a variety of colours, where they laid on their oars while the music played "God save the King," then proceeded to the Old Fort where a landing place was prepared, and as soon as the General landed he was saluted with 19 guns from the *Roebuck* and the same number from the *Vigilant.* The company as they quitted the boats formed themselves into a line of procession and advanced between two files of grenadiers till they came to a square of 400 yards railed in and prepared for the tournament. In front of the square was Sir Harry Calder's house appearing through two triumphal arches erected one in honour of Lord, the other of General Howe. Two sofas in form of amphitheatres, formed the advanced wing of one of these arches, on these the ladies seated themselves, advancing to them through the centre of the square. On the lowest seats of each were seven virgins dressed in Asiatic habits and wearing the different colours of the knights who chose them for their damsels. Here the tournament commenced, when the elegance and richness of the different dresses of the knights and squires (not one of them worth Sancho's little finger), their horses' trappings and caparisons, the taste displayed in their mottoes and devices, the various evolutions and revolutions and feats of arms they performed, exhibited altogether a spectacle as rare as it surpassed the most sanguine expectations of the beholders. ('Tis very true indeed madam, for they did not expect to see anything so ridiculous). As soon as the tournament ended, the valiant knights and gentle squires, two and two, moved through the first triumphal arch which was decorated with rare ornaments. At the top stood Master Neptune with his trident, (but, poor fellow, he had got his arm broke by the tail of a fish I suppose), in the interior were the attributes of that god, and in a niche on each side stood a sailor with his sword drawn (a marline spike would have been more ornamental). On two wings were plumes of feathers with the inscription on the entablature, *Laus illi debetur, et alme gratia major.* An avenue of 500 yards in length and 40 in breadth, lined with troops and decorated with the colours of the different regiments placed at proper distances, led to the second arch, between whose columns the knights and their attendants ranged themselves, and the company preceded by all the music of the army, advanced in procession, and were led into the house through the second arch erected in honour of the General. This arch was of the Tuscan order. On the pediment was Miss Fame with her trumpet, in the interior a column of feathers and military trophies, and on the entablature *I, bone quo virtus tua te vocet, I, pede fausto.* The house within was painted in a light and elegant style with festoons and several emblematical figures, while mirrors, and girandoles, and chandeliers decorated with wreaths of different coloured gauze adorned the walls. The company were entertained with tea and refreshments and then danced till half-past 10 o'clock. The windows being then thrown suddenly open, a grand and beautiful display of fireworks was exhibited. Towards the conclusion, the triumphal arch near the house appeared magnificently illuminated, and Fame blew from her trumpet in letters of light "Thy laurels shall never fade." After the fireworks the company sat down to a supper of 1024 dishes in a magnificent apartment built for the occasion, decorated in the same style and elegance as the rooms in the house. The herald of the Blended Rose in his robes of ceremony announced by sound of trumpet the health of the King, the Queen, and Royal

Family, the Army and Navy and their representative commanders, and the ladies. A salute of music and three cheers graced each of these toasts. After the supper the dancing was renewed, and the whole broke up at 4 in the morning.

The following lines were intended to have been declaimed by the herald after the knights had approached the Pavilion, in which were the General and the ladies. He bore in his hand a laurel wreath with the following inscription, but in delicacy to the General this was suppressed.

Mars conquest plumed, the Cyprian Queen disarms,
And victors, vanquished, yield to beauty's charms.

(He hangs the Crown on the front of the Pavilion and proceeds).

Here then the laurel,—here the palm we yield,
And all the trophies of the tilted field;
Here, Whites and Blacks[1] with blended homage, pay
To each device the honours of the day.
Hard were the task, and impious to decide
Where both are fairest, which the fairer side
Enough for us, if by such sports we strove
To grace this feast of military love,
And, joining in the wish of every heart,
Honoured the friend and leader ere we part.
When great in arms our brave forefathers rose,
And loosed the British Lion on his foes;
When the fall'n Gauls, then perjured too and base,
The faithless fathers of a faithless race.
First to attack, tho' still the first to yield,
Shrunk from their rage on Poictiers laureled field;
Oft, while grim war suspended his alarms,
The gallant bands with mimic deeds of arms,
Thus to some favourite chief the feast decreed,
And decked the tilting knight, th' encountering steed.
In manly sports that served but to inspire
Contempt of death, and feed the martial fire.
The lists beheld them celebrate his name.
Who led their steps to victory and fame.
Thro' ev'ry rank the grateful ardour ran,
All feared the chieftain, but all loved the man;
And, fired with the soul of this bright day,
Paid to a *Salisbury* what to *Howe* we pay.
Shame to the envious slave that dares bemoan.
Their sons degenerate, or their spirits flown—
Let maddening Faction drive this guilty land
With her worst foes to form th' unnatural band;
In yon brave crowd old British courage glows
Unconquered, growing as the danger grows.
With hearts as bold as e'er their fathers bore,
Their country they'll avenge, her fame restore.
Roused to the charge, methinks I hear them cry,
Revenge and glory sparkling from each eye,
Chained to our arms while Howe the battle led,
Still round these files her wings shall conquest spread.
Loved tho' he goes, the spirit still remains
That with him bore us o'er those trembling plains
On Hudson's banks the sure presage we read
Of other triumphs to our arms decreed;
Nor fear but equal honours shall repay
Each hardy deed where Clinton points the way.

---

[1] The Knights so distinguished.

There is a gap in Captain Downman's diary between May 19th and June 7th, caused apparently through some leaves of his journal book being missing; as it was the time when he was sick and leaving the army for New York, the break in his diary is not of much importance.

A few days after the Mischianza, General Sir W^{m}. Howe, who had resigned his command, quitted the army and was succeeded by General Sir Henry Clinton. It must be acknowledged that on the whole Sir W^{m}. Howe had been successful in the field, though it is true that his forces were much in excess of those of the Americans, but whether from political or other reasons, these successes were never followed up or improved. At Long Island, in the Jerseys, at Brandywine, at White Marsh, and at Valley Forge fortune placed the enemy in his power, but he failed to seize the advantage. Indeed the only result of his campaign in 1777 was the acquisition of good winter quarters for the army at Philadelphia.

June 7th, 1778.—This morning early the *Trident* appeared and saluted the *Eagle*, which was returned, she soon came to; the Commissioners[1] quitted her and got into a small armed sloop and proceeded into town. They were saluted by the *Trident* on leaving her.

June 8th.—We left Newcastle and went down to Reedy Island and joined a great number of ships waiting for orders to proceed somewhere.

June 11th.—We hear that our army is still in Philadelphia, and that the Commissioners are gone out to treat with the rebels. A fleet of 12 or 13 sail of ships from Cork with provisions came to anchor here to-day.

June 13th.—I left the *Lord Howe* and went on board the *Duke William* hospital ship. The latter is under sailing orders for New York with a number of other ships. The former may stay much longer, which is the reason I quit her.

June 14th.—Weighed anchor from Bombo Hook with a fair wind, with about 60 sail, and on the 17th, in the afternoon, we anchored at Sandy Hook. On the 18th we got up to New York.

---

[1] The Commissioners were Lord Carlisle, Governor Johnstone, and Mr. Eden, appointed by the King with full powers to treat with the Colonists under the act of Parliament of March, 1778.

(To be Continued).

12-PR. GUN WITH ELEPHANT EQUIPMENT.

BY

CAPTAIN W. B. R. SANDYS, R.A.

AS the Chestnut Troop R.H.A. have recently temporarily undergone a novel experience in equipment during the present disturbances on the N.W. Frontier of India, I think a short account of this may be of interest to many of the Regiment.

This is not a new equipment, as such equipment was used—with success, I believe—in both the Jowaki Expedition of 1877-78, and the last Afghan War—in the latter case F/A. had this equipment, but they had their horses as well, and I believe only used the elephants to get the guns over ground which was too difficult for wheels.

During the third week in August last we were hastily sent to Rawal Pindi from Umballa to replace 'K' Battery ordered to Jamrud Fort. Late on 28th Oct. orders came to Pindi for the immediate formation of a 12-pr. battery with elephant equipment to join the Peshawar Column, then at Bara, some 7 miles out of Peshawar, officers, detachments, guns, etc., to be furnished by 'A' R.H.A.

The first orders were for the battery to train to Campbellpore, where the elephants of the heavy battery (12 Eastern Division R.A.) were to be taken over, and then to march to Peshawar when ready. These orders were later on cancelled, the elephants marching alone to Peshawar, where they were to be taken over.

The next two days were busily employed in sorting the small gun stores likely to be required, drawing cradles and ammunition boxes from the Arsenal, as well as boxes for artificers tools, battery office, and so on. All N.C.O's and gunners left the cavalry pattern sword and belt behind, and were issued with the Mountain Battery pattern.

All men proceeding with the battery were issued with warm service clothing, consisting of a warm coat, cardigan jacket, waterproof sheet, extra blankets, Balaclava cap, putties and gloves.

Before leaving Pindi, sixty-five animals were taken over for carrying the ammunition; these consisted of 30 mules drawn from the Mountain Artillery Depôt, and 35 Punch ponies drawn from the Commissariat Department. The native establishment sent with them consisted of reservist drivers of Mountain batteries, transport drivers, and gunners of the Hyderabad Contingent Artillery.

Transport complete (19 mules and 56 ponies) was also taken over before leaving Pindi.

Tentage and baggage was taken on field service scale, viz: officers, 80 lbs. of the former and 70 lbs. of kit. N.C.O's and men 10 lbs. of tentage and a 40 lb. kit. Officers likewise took one charger and a baggage pony.

On the afternoon of 31st Oct. orders came for a start at once. We quickly got entrained, and left by 8.30 p.m.

Daylight on 1st Nov. saw us at Peshawar station, where the detraining took place; teams and limbers were kindly sent down by the 51st Field Battery R.A. to draw the guns up.

Great was the disappointment on arriving to find that General Hammond, commanding the Peshawar Column, had issued orders for us to stay in Peshawar for the present; he didn't deem the presence of elephants in his camp advisable.

On 2nd Nov. eleven elephants came in from Campbellpore, and on the following day the remaining four arrived from Khusalgarh, where they had been working on detached duty. Lieutenant Locke, of the heavy battery, was attached to look after the elephants; the attendants consisted of 1 Jemadar mahout, 15 mahouts and 15 assistant mahouts.

All hands were now hard at it, learning and making improvements in the drill: a drill was found in an old copy of the R.A. Regulations in India. This was of great assistance in the beginning.

On 7th Nov. we were reinforced by a draft of 16 gunners from 'H' R.H.A.. This was very necessary; it is most important to have the 12 numbers in each detachment big, tall men; up till then the few drivers, who had come, made up the detachments, and their shortness of stature was a handicap and threw the strain on to the tall numbers.

During the first three weeks the battery was inspected by the G.O.C. Peshawar Column, G.O.C. Punjaub Army, and the I.G. of Artillery. By this time the men had learnt to work very smartly, and to get the gun and carriage up and down the elephants in excellent time.

Our chargers were not of much use, as all ranks marched on foot; the C.O. at times found it necessary to ride during a route march to superintend things, for the length of the column was considerable when the transport was out as well as the ammunition line of animals.

On 7th Dec. the men and transport marched out to Michni, and stayed the night there; the following day they marched on to Shabkadar Fort. On the 9th they marched back into Peshawar, a distance of 18 miles; this was covered in less than 5 hours; 41 miles were done in the 3 days' trip.

As it was impossible for the battery to be used with the Peshawar Column in the Bara Valley, owing to the intricacy of the ground, we were all looking forward to the advance up the Khyber, where we hoped we should be sent—our hopes were doomed to disappointment—and a few days after the advance took place on 23rd Dec. orders came for the return of the battery to Umballa, horses and the rest of the equipment left behind at Rawal Pindi to be picked up on the way. Umballa was reached on the morning of Jan. 5th.

Drill.

Gun. At "mount the gun and carriage," the elephant kneels down, the gun is disconnected from the carriage, and lifted over the wheel on to two skids inclined against the side of the elephant; the gun is hauled up the skids by means of parbuckling ropes, and so into the cradle on the elephant's back. The two wheels are lashed together over the gun with their tops against each other; skids and handspikes are lashed on each side outside the wheels. The breech of the gun is towards the elephant's head

Carriage. The carriage is raised by means of lifters passed under the axle-tree arm, and carried into the cradle over the elephant's tail. The rear part of the cradle has a slot cut in it, into which the trail fits. and a series of small slots on the front of the cradle correspond with the ins and outs on the breast of the carriage.

Spare Gear. The three spare elephants carried the spare stores for each section, viz., for each section:—1 pr. wheels; picket ropes and pegs; 2 picks; 6 spades and shovels; 4 buckets.

These spare animals carried no cradles, but only the usual pad stuffed with grass. The wheels were lashed together, tops inclined towards each other, and lowered on to the elephant's back, the remaining stores were placed between the wheels and lashed.

Ammunition animals were now loaded.

Action. In coming into action, the dismounting took place under cover—guns when all ready were run up by drag ropes onto their respective layers; 1st line ammunition boxes were taken off and placed on the ground 15 yards in rear of each gun; the elephants and all ammunition animals being kept under cover. The captain or Q.-M.-S. sent up fresh ammunition animals as required, the empty boxes being brought back on the return journey. The usual four numbers were at the gun. Nos. 5 and 6 knelt down in rear of the 1st line boxes, and kept the gun supplied with full boxes when needed. The remaining six numbers of each detachment kept under cover. At "cease firing" and "mounting" the drill was reversed to that when coming into action.

Formation. The usual formation of moving off was column of sub-divisions, thus:—

C.O. and trumpeter.
Range-takers.

Sub-divisions followed each other thus:—

Detachment front.
Carriage elephant.
Gun elephant.
1st line ammunition animals.

In rear of the last sub-division came the 2nd line of ammunition animals; and in rear of all, the transports and rear-guard.

The 1st line of ammunition consisted of four animals, viz.:—One of small stores and three of ammunition. (Two of these six boxes of ammunition always contained friction tubes).

Each animal in the 1st line was led by either a European driver or a native gunner or driver.

The 2nd line consisted of the remaining ammunition animals, under the command of the captain or Q.-M.-S.

EQUIPMENT.

Cradles. In the Rawal Pindi Arsenal are a complete set of cradles for a 12-pr. battery, including guns, carriages, wagons, and 3rd line. We only drew six gun cradles and six gun-carriage cradles; these are made of wood strengthened lengthways by means of iron bars.

Skids. The parbuckling skids are some 9 feet in length; square in section with sides of about 3½ inches; at one end is a short chain and hook to fasten the skid on to the under part of the cradle when mounting or dismounting the gun.

Lifters. The lifters are of bamboo, about 3 inches in diameter, in the middle is lashed a piece of wood, rectangular in shape; in it is cut a semicircular groove, for the axle-tree arm to rest in when mounting or dismounting the carriage. The parbuckling ropes were ordinary drag ropes of every day use.

Ammunition. The ammunition ordered to be taken per gun was:—72 shrapnel, 2 case shot, 72 T and P fuzes, 74 cartridges, and 150 friction tubes. The boxes were the ordinary Mountain Battery pattern, with partitions to carry 7 rounds; they were not altered at all for the 12-pr. shells. In each box were packed 5 shell, 5 cartridges and 5 fuzes, as well as friction tubes in certain of the boxes, which were marked with a T on the outside. Ammunition boxes. As these boxes were not intended for 12-pr. shells some tow and packing were necessary to prevent the contents moving about too much. Portable magazines. The portable magazines were always kept strapped on to the gun-carriage; in the right one were the sights, and in the left one were 3 cartridges, 2 case shot, and one shrapnel ready fuzed.

AMMUNITION AND TRANSPORT ANIMALS.

Mules. The ammunition mules were a fine lot, and very well up to their loads. Those for transport purposes were of course much smaller, but carried their loads well.

Ponies. The ammunition and transport ponies were Punch animals; these had originally been offered by the Rajah of Punch to the Indian Government, but the latter being unable to accept them, purchased them for transport purposes. These ponies were small thick-set animals, about 11.2 or 11.3 hands in height, and considering their size carried their loads wonderfully. They had a clear maund of ammunition on each side; thus with the boxes and saddle the weights on their back must have been a good three maunds (240 lbs). Each subdivision had its own ammunition told off as under :—

	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	TOTAL.
Ammunition	8	7	8	7	8	7	45
Small Stores	1	1	1	1	1	1	6
Artificers, etc*	1	1		1	1	1	5
Spare.....................	1	2	1	2	1	2	9
Total...............	11	11	10	11	11	11	65

* No. 1 carried Farrier's tools.
No. 2 ,, Collarmaker's tools.
No. 4 ,, Office.
No. 5 ,, 1 box of Farrier's tools and 1 of the collarmakers.
No. 6 ,, Wheeler's tools.

N.B.—After deducting the shrapnel that was carried in the portable magazine each sub-division had left 71 shrapnel. This 71st round, in the case of the even sub-divisions, was carried by the 8th ammunition animal of the odd sub-divisions.

Transport was likewise told off; first into sections and subsequently into sub-divisions by section commanders. In this way each No. 1 knew his own animals, had them under his own care, and it was to his, and his sub-division's, advantage that they should be well looked after and ready for any emergency.

NOTICEABLE POINTS.

(i). 12 tall men are essential in each detachment. The gun when carried over the wheel is a heavy dead lift for 8 men, and the gun-carriage when being mounted must be lifted shoulder high by tall men, otherwise it will not clear the cradle.

(ii). Care must be taken that the cradles are put on quite straight, and that the ropes girthing up the elephants are well pulled tight; if these points are not attended to a serious accident may result. Girthing up of all pack animals should be as carefully attended to.

(iii). Ammunition boxes and loads generally, should be put on both sides simultaneously. This applies equally when putting the wheels on to elephants.

(iv). Loads must be equalised on both sides.

(v). Elephants' feets are liable to get sore when working on metalled roads on stony ground. They should be let off work for 2 or 3 days and their feet 'chobed,' in order to make them hard. This consists in putting on a mixture of grease, aloes, wax, etc; the ingredients are obtainable from the Commissariat. If the 'chobing' is well done the soles of the feets should be quite hard in 2 or 3 days.

(vi). In spite of the somewhat rough usage the gun was subjected to, the Scotts' sight brackets did not get out of adjustment. Several of the small levelling screws on the bracket were, however, either broken off or bent.

(vii). The ammunition mules carried ordnance saddles, and the ammunition ponies the smaller transport saddles. The ammunition boxes are made for the former saddle, and the rings on the boxes are too far apart (by about 2 inches) to go on the transport saddles' hooks. This difficulty was obviated by the farrier making up a pair of S hooks for each box to be carried by the ponies; these hooks were closed on to the rings on the boxes, and then hooked onto the hooks on the saddle.

(viii). The harness was very much too big all round for the Punch ponies, and required a good deal of cutting down to make it look at all ship shape.

The way in which the men buckled to at their new work was most praiseworthy, and considering how little a Horse Artilleryman is asked to walk as a rule, pedestrian powers were soon manifested, and good times done during route marches. Not being sent beyond Peshawar (except 24 men, who augmented No. 1 Mountain Battery for the week they were away in the Bazar Valley) was a great disappointment to everyone.

No one will argue for a moment that the presence of elephants was a necessity in the Khyber, but still, considering that the battery was in every way completely organised to move at a moment's notice, it seems a pity that it was not found possible for the equipment to be tried outside Peshawar, when some of the vexed questions relating to elephants and their doings might have been settled for good. The arguments against such a battery being used on service were numerous. The elephant's enormous appetite (480 lbs. of green food per diem) is always against his use; then there are the usual questions asked: What will an elephant do if hit, or even when sniping is going on will there not be a stampede? Can he get over rough ground, and doesn't he get sore feet easily, and so on. These questions can only be truthfully answered after practical experience—answers are otherwise based on imagination only.

THE MEGAPHONE AS A GARRISON ARTILLERY ADJUNCT.

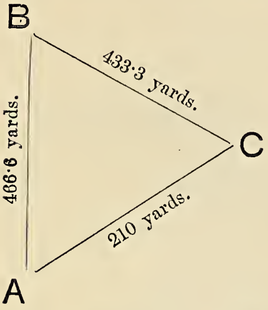
BY

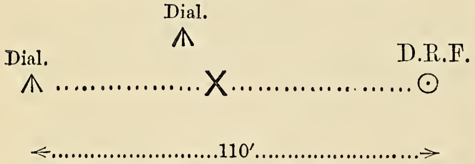
LIEUT.-COLONEL J. C. DALTON, R.A.

THE Megaphone is nothing more nor less than our old friend the Speaking Trumpet, only in a much cheaper and simpler form.

When recently on a trip in the United States and staying at a friend's house in the country, I noticed one of these instruments in the house, and not having seen one before, enquired as to its use. It was a megaphone standing some 2′ 6″ high, and my friend explained to me that it was used by him and by others in order to converse at considerable distances when the human voice could not be heard under ordinary circumstances. He soon convinced me of its use by speaking through it to some people he knew who were driving along the road about a quarter of a mile off and who were quite unconscious of his presence. He called to one by name in a quiet and natural voice through the instrument; the person addressed at once turned to see who was speaking to him and was asked whether he would come in to tea that evening or some such remark. He replied, and my friend by putting the mouth piece of the megaphone to his ear, clearly heard the reply. The idea at once struck me that this instrument might be very useful for passing on words of command in a fort, or from one fort to another, and might save the necessity of having connecting orderlies, so I determined on my return to Bermuda to test it at fort-manning. I will briefly describe the instrument which is so simple that it requires but little description.

Megaphones are of different sizes according to the distance at which it is required to convey the sound. They may be procured from about 1 foot in length to 5 feet or even more if required. I got one of 15 inches which cost 7s., and one of 3 feet which cost £1. This is the retail price in the New York shops; they could, if necessary, be probably made for half of those prices, or still less if got in a quantity. The instrument is simply a cone of millboard or cardboard bound with some thin metal at the small end and wood at the large end. The smaller end is the mouth piece and sufficiently large to place to the lips. The larger instruments have a handle to hold them by when raising them to the lips. They are very light. At St. George's, Bermuda, we have three forts forming a triangle, the sides of which are as shown. That at *A* has a considerable command over that at *B* and also over *C*. For the first experiment I was a Fire Commander at *A* during the manning of these three forts, and in spite of a wind blowing in the direction *B A*, which was against the megaphone when used from *A*, I was able to convey orders to *B* and *C*. I used the large megaphone at *A*, and the smaller was at *B*. When talking from *B* the Battery Commander there could be heard distinctly at *A*. I then tried it as a means of communicating between the D.R.F. and the dial numbers. As I have said before, the wind was very high and we were on the top of the keep. The positions were as shown on accompanying figure. The ranges were called out from the D.R.F. to the dial numbers, but it was found that the dial numbers did not hear them very distinctly, and accordingly the B.C. decided to place a connecting orderly at X in order to pass on the ranges. This is never a satisfactory arrangement for, as is well known, orders do not gain in accuracy or distinctness by being passed on by word of mouth from one to another especially if the men whose duty it is to pass them on have a strong provincial accent or pronounce their words indistinctly. I have myself, for example, heard the B.C. shout out "30′ right deflection" to the furthest gun of a group of three guns; owing to the distance it was necessary to have a connecting orderly; this man heard the order clearly, passed it on as "thorrty minutes" and the gun captain gave it out as "forty" with the natural result! In the case of which I am now speaking I directed my Adjutant to station himself at the D.R.F. with the megaphone, and he gave out in a quiet voice, as if he were talking in a room, the ranges for the dial numbers—"Range 1,900, increasing slowly," "Range 2,100, shortening slowly," &c., with the result that the dial numbers, without even turning their heads, heard the orders quite clearly and distinctly as if they had been spoken into their ears, and adjusted their dials accordingly. This part of the experiment was eminently successful and did away with much shouting, with possible mistakes and the consequent recriminations.





Since that experiment I have left the megaphones in the charge of the Major Commanding the Armament district and he reports very favourably of them. He says that naturally the force and direction of the wind influence it, and that one needs to study the best method of holding it and of inflecting the voice in order to get the best results. He had used it with a fairly strong wind and found it to work, but of course finds it better (for long distances) when the day is still. Down wind the voice can be carried a very long way. For short distances such as I have alluded to above when the guns of a group are somewhat far apart, as must be the case in some works, it is invaluable.

I hope to make more extended trials of the megaphone, but I have seen enough of it already to come to the conclusion that it is quite worth while to take up and try. It is cheap and so simple of construction that for a few pounds some large fortress could be furnished with a dozen or so, and exhaustive trials could take place under all kinds of conditions.

A law would soon be discovered which would govern its use, and it would, I believe, become a useful member of that large and cosmopolitan family known as "garrison artillery adjuncts."

Though very light it is a little cumbersome when the large sizes are employed, and undoubtedly for long distances you must use large sizes. But I see no reason why inventive ingenuity should not make it collapsible for conveying about. Moreover, when using large sizes it is convenient to hang it on a light tripod close to where the person is who has to give the orders. It could easily be arranged that the drum reader of the D.R.F. could have it near him so that without leaving his instrument he could put his mouth to the megaphone and call out the ranges. For short ranges quite a small megaphone would suffice.

I claim the following advantages for this instrument :—

(1.) Simplicity, lightness and cheapness.

(2.) It avoids all dangers arising from more than one person passing on orders which they perhaps hear imperfectly and retail wrongly.

(3.) The orders sent through the megaphone are passed on in the natural voice of the person using it, and whose voice is generally familiar to those who receive the orders.

(4.) With two megaphones conversations can be carried on at a considerable distance in far shorter time and with less chance of mistakes than when sent by telephone, or by signalling.

(5.) When telephones and signallers fail it is useful to fall back on.

(6.) It could be heard in a fog, and smoke does not influence it.

(7.) It effects a saving of men who would otherwise have to be used as orderlies.

As to its disadvantages I can only suggest very few so far, though I have no doubt that others will be found, for no instrument can be perfect.

(1.) It is, in the large sizes, rather cumbersome, and a man with it to his mouth might be conspicuous.

(2.) If the enemy were near and the wind favoured him, he might hear the orders which were intended to be used against him.

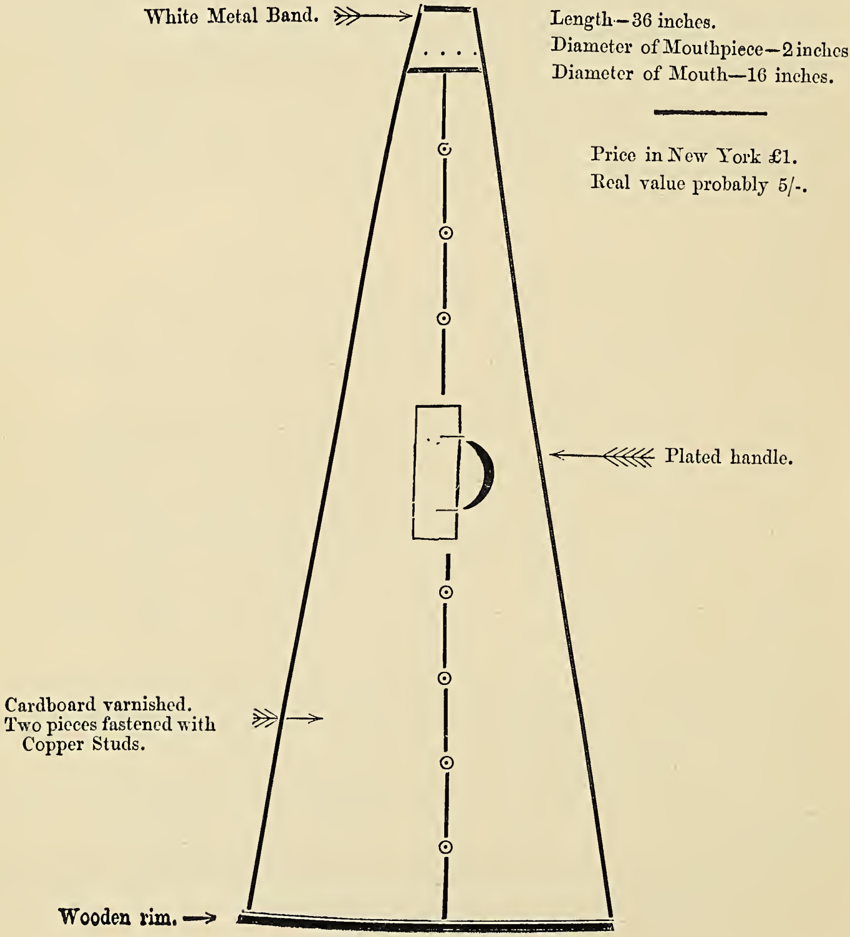
(3.) It is hard to speak with it against a high wind, and if much noise were going on near the person who was receiving the order, he might have a difficulty in hearing.

But these could easily be answered and legislated for.

I would be glad to know if others have tried this instrument and what their experiences are. If anybody wants two or more to try I could get them probably at prices cheaper than I paid for mine and could have them despatched direct.

MEGAPHONE.

(Scale ⅛ of Original.)



THE SERVICES

OF

LIEUT.-COLONEL FRANCIS DOWNMAN, R.A.,

IN

FRANCE, NORTH AMERICA, AND THE WEST INDIES BETWEEN THE YEARS 1758 AND 1784.

EDITED BY

COLONEL F. A. WHINYATES, *late* R.H.A.

The illness which compelled Captain Downman to go by sea to New York, deprives us of any account from his pen of the subsequent operations in the Jersey's in 1778. There exists however in the R.A. Library at Woolwich, a book indorsed "Brigade Orders, No. 2" which is in reality a diary that details the operations with General Sir W^{m}. Howe's army in the American war between June 17th, 1778 and December 24th, 1779. This record gives what happened after Captain Downman left the army until it arrived at New York. The diary is evidently written by an artillery officer, probably the Brigade Major, Captain S. P. Adye, but be that as it may, with such a valuable record available, it seems a pity not to utilize the portion that will complete our knowledge of the campaign. That part has accordingly been extracted and embodied in a separate chapter so as not to be confused with Captain Downman's narrative. It is worthy of remark that the entries in Captain Downman's diary and in this record on identical dates agree in the most minute particulars, an evidence of the trustworthiness of both.

LIBRARY
U. JUN 20 1898 S.
PATENT OFFICE

CHAPTER IV.

Account of the evacuation of Philadelphia, the march through the Jerseys, battle of Freehold or Monmouth Courthouse, and arrival of the British Army at New York, as recorded in Brigade Order Book No. 2.

June 17th, 1778.—The chief part of the artillery stores, provisions, and baggage having been previously transported across the Delaware to Cooper's Ferry on the Jersey shore, and put under the protection of Brigadier-General Leslie's corps (consisting of the following regiments which had been detached some time before for the purpose of covering the wood cutters) viz., the 7th, 26th, 46th, 55th and 63rd with Colonels Clifton's and Allen's battalions of provincials, and Captain Hovenden's troop of provincial dragoons. At 4 o'clock this morning Lieutenant-General Knyphausen crossed over and joined General Leslie with the following regiments, viz :—

Queen's rangers, provincials,
Jägers mounted and dismounted,
Hessian Grenadiers,
Two battalions New Jersey Volunteers
Maryland Volunteers
Volunteers of Ireland
Caledonian Volunteers
} Provincials.

At 6 o'clock in the evening the remainder of the troops were put under arms, and marched to the rear of the several redoubts, where they lay upon their arms all night.

June 18th.—A little after daybreak the troops were put in motion, and abandoned the redoubts as well as the city of Philadelphia without the least annoyance or molestation from the enemy, marching in three columns to Gloucester Point, where flat boats lay ready for their reception, in which they crossed the Delaware and landed on the Jersey shore, the whole having got over by 9 o'clock. Some few of the enemy's dragoons entered the city immediately after the troops had quitted it, and appeared upon the shore after they were in the boats. About 11 o'clock the troops began their march towards Haddonfield, where they were joined by the corps from Cooper's Ferry, under the command of Lieutenant-General Knyphausen. The whole army, except an advanced corps under Brigadier-General Leslie which had pushed forward to Foster's Town, encamped at Haddonfield.

June 19th.—The Commander-in-chief marched at daybreak with the following corps, viz :—

1st and 2nd battalions Light Infantry
16th regiment Light Dragoons
1st and 2nd battalions British Grenadiers
Three battalions Hessian Grenadiers
Brigade of Guards
4th brigade of British
3rd brigade of British
17th regt. Light Dragoons
Two medium 12-prs. and one 5½ inch howitzer.

At the same time Colonel Prescott was detached with the 28th and 55th regiments of foot, and two light 6-prs. to Billings Port in order to bring off the 15th regiment and the provincial regiment of Vandyke, which had taken post there some time before. These regiments joined him at Manto Creek, and the whole marched to Haddonfield in the evening, having met with no interruption in the march, except from a few stragglers supposed to be militia, who by a scattered and concealed fire wounded the surgeon's mate and a soldier of the 55th, and killed a dragoon's horse. In order to prevent delay, which would have been occasioned by a deep ravine across the high road the troops were to pass, it was judged proper (as the corps left under the command of Lieutenant-General Knyphausen was to wait at Haddonfield for the return of Colonel Prescott) to take advantage of this day's halt to remove the park of artillery and provision train across the ravine, which was accordingly done, one Hessian and two provincial regiments being advanced to cover their front and flanks; Lieutenant-General Knyphausen's quarters still continuing at Haddonfield and the remainder of his division of the army in their former position. The first division of the army, which had moved forward the day before under the immediate command of the Commander-in-chief, and had taken up their ground near Evesham, marched this day, the 20th, to Mount Holly, a remarkably strong and defensible post which it was judged the enemy might have endeavoured to occupy, General Maxwell having been long hovering about this part of the country with 1,500 or 2,000 men and some Jersey militia, but they early retired towards Bordenton and Trenton. The advanced guard of Brigadier-General Leslie's corps, which was in front of the 1st division, fell in with a small party of them, who exchanged a few shots with a party of jägers, by which one jäger was killed on our part, and a captain of the militia on that of the enemy. The army in their march of this day crossed Belly-bridge, Saw Mill branch, and Ancocas Creeks. The 2nd division of the army, under the command of Lieutenant-General Knyphausen, also marched this morning from their right in half divisions wherever the road would admit of it, the country which the army marched through becoming more open. The advanced guard consisted of 200 British, followed by a detachment of the 17th dragoons, the British and Hessian infantry, the park of artillery, provision train and baggage, the rear-guard composed of one British and one Hessian regiment of foot and a party of the 16th regiment of dragoons; the flanks of the artillery, provision train and baggage being covered by the 10th regiment and the provincial corps of Chalmers and Clifton. This division arrived at their new ground near Moore's Town (where Lieutenant-General Knyphausen and the General officers under his command fixed their quarters) about 9 o'clock in the morning, and very soon after their arrival a very heavy rain fell which continued almost incessantly for 14 or 15 hours, and not only rendered the situation of the troops, who lay in temporary huts, very disagreeable, but also injured the roads, which had hitherto been sandy, but now became clayish; the division under Knyphausen, notwithstanding, marched the next morning (Sunday, the 21st) at 3 o'clock, nearly in the same order of march as the day before, and joined the other division which had halted at Mount Holly, about 9 o'clock in the morning. The whole army being again united at Mount Holly encamped in two lines, the division under Lieutenant-General Knyphausen forming in the rear of that which had taken post there the day before.

June 22nd.—The army marched again in two divisions, the 1st under the command of Sir H. Clinton and Lord Cornwallis moving at 3 o'clock, and the 2nd under Lieutenant-General Knyphausen at 6, and following the baggage of the 1st; the face of the country though much better settled and more open than at the beginning of our route, not admitting of the two divisions taking different roads. The army again encamped in two lines near the Black Horse, where the Commander-in-chief had his head-quarters. One of the rebel party who had fired upon the jägers on the 20th instant and was taken prisoner, proving to be a deserter from the 28th regiment, was tried and condemned by a general court martial at Mount Holly, and this day executed and left hanging on a tree near the high road.

June 23rd.—From this encampment the army marched in two columns. Brigadier-General Leslie's corps consisting of the 7th, 26th and 63rd regiments of foot, and reinforced by Hovenden's troop of provincial dragoons forming the vanguard of the 1st division, which formed the left column and marched at 4 o'clock. The 2nd division under Lieutenant-General Knyphausen, led by the 2nd battalion of light infantry formed the right, and marched as soon as the 1st division was off the ground; this column he ordered to pay every attention to their right flank. The enemy had all along made attempts to obstruct, or at least retard our march by pulling up the bridges thrown across the small creeks and causeways, and felling timber across the roads, but have never appeared with any troops to protect or defend any of the passes, though many very strong by nature, and which might have been rendered much more so by art, occurred in our route. A party of about 50 men showed themselves at a mill in Wreckels Town Creek, but upon the first appearance of the advanced guard of General Clinton's column, went off without firing a shot, however, they exchanged several upon this column coming up to Crosswick, by which a captain of the Queen's rangers was wounded, and one rebel killed, one wounded, and another taken, but upon our bringing up two 3-prs. belonging to the 1st battalion of light infantry, they again went off, and the 1st division advanced to Crosswick, the advanced corps under Brigadier-General Leslie being pushed towards Bordenton. Lieutenant-General Knyphausen's division lay this night at Wreckels Town. Brigadier-General Leslie's corps was this evening fired upon with cannon from a work the enemy had erected on Bordenton Creek, which he crossed the next morning, and marched through Bordenton, exchanging some few cannon shots on the enemy endeavouring to molest him by pulling down a draw-bridge in order to prevent his effecting a junction with General Clinton at Crosswick.

June 24th.—The 2nd division, under Lieutenant-General Knyphausen, marched at 4 o'clock in the morning, and formed upon the heights above Wall's Mills, whilst a bridge over Crosswick Creek, which had been destroyed by the enemy, was repaired; this was completed about 11 o'clock, and all the column over it by 12, bending their course to Emely's Town, where they arrived about 3 o'clock and lay that night. As soon as General Clinton received advice of General Knyphausen's column having passed the bridge and destroyed it, he moved forward with the 1st division from Crosswick towards Allenstown, thereby covering the left flank of Lieutenant-General Knyphausen's column.

June 25th.—The whole army continued their route, Lieutenant-General Knyphausen's division moving off their ground near Emely's Town at 4 o'clock in the morning, General Clinton's column with Brigadier-General Leslie's corps filing off to their right and falling into the rear of Knyphausen's division. The army had now advanced so far into Jersey that there was more reason to expect the enemy in our rear than in front; some alteration was therefore made in the disposition of General Clinton's column, the guards, grenadiers, and light infantry forming the rear of the column instead of the front. The whole halted from 12 to 3 o'clock in order to refresh the men and horses and then proceeded, Lieutenant-General Knyphausen to Thompson's meeting house and General Clinton to the Rising Sun. The roads through which the army marched this day were remarkably bad.

June 26th.—The army was again put in motion, Lieutenant-General Knyphausen's division still continuing in front, moved at 4 o'clock in the morning, and the rear division under Clinton and Lord Cornwallis at 6 o'clock. The first division reached Freehold between 9 and 10 o'clock, and encamped with their right extending about a mile and a half beyond Monmouth Court House on the road to Shrewsbury and Middleton, and covered by the skirt of a small wood. The division under General Clinton took up their ground about two miles on the other side of the Court House, with their right towards the Court House and their left to a thick wood and a morass running towards their rear, the front of the whole covered by a wood and towards the left by a morass. The first part of this day's march was through a close and unsettled country, the latter through one more settled and open, the village of Freehold standing on an extensive plain.

June 27th.—The army halted this day. Many straggling parties of the enemy, both horse and foot, were seen hovering about, and some of the King's troops were picked up by venturing too far beyond the advanced pickets. The greater part of the village of Freehold was abandoned, but some stands of arms were found, supposed to belong to the militia.

June 28th (*Sunday*).—The army marched in two columns, the left division led by General Clinton taking the high road from Freehold to Middleton, and the right under Lieutenant-General Knyphausen, having with it the whole of the baggage of the army, marched through a close woody country for several miles without the least molestation or annoyance from the enemy until about 12 o'clock, when a party of 15 or 16 of their militia, taking the advantage of our flanking parties being too widely dispersed, broke through the provision train and wounded two or three men and as many horses, without halting at all, and another party of about 40 or 50 made an attempt upon the baggage, but went off again upon the appearance of two companies of the 40th regiment, which composed part of the rear guard. Upon the alarm being given in front, the 10th and 49th regiments, which had been covering the flanks of the artillery, provision train and baggage, were ordered to the rear with two 3-prs., and the 2nd brigade of the British was halted to reinforce them in case of necessity. The enemy, however, did not make any further attack upon this column, but the engagement with the left column was of a much more serious nature.

Mr. Washington, having crossed the Delaware at Correll's Ferry with his whole force, marched to Hopewell township about five miles from Princetown, when he halted till the 25th instant, making large detachments under Wayne, La Fayette, and Morgan. On the 28th in the morning he marched to English-town, about five miles from Monmouth, having an advanced corps of 5,000 men under General Lee, which about 8 o'clock in the morning came up with the rear of the left division, but were soon repulsed and driven back with little or no loss on our part. General Clinton being apprehensive in case of his not pushing them further, that they might fall in with our light column, which was much encumbered with provision waggons and baggage of the whole army, therefore continued his pursuit and between 11 and 12 o'clock fell in with the main body of their army, when a very heavy cannonade supported by musketry took place on both sides for several hours, and the enemy were driven from height to height beyond the village of Freehold, but night coming on, General Clinton thought proper to make a junction with his other column, which he effected about nine o'clock the next morning, the troops having been 30 hours without halting or hardly any refreshment for man or horse. Many more men died through fatigue alone than fell by the hands of the enemy. The loss on the part of the King's army amounted to about 340 killed, wounded and missing, and fell chiefly upon Captain Williamson's and Standish's brigades of artillery, 1st battalion of guards and the two battalions of British grenadiers. The most mortifying circumstance attending the action was that notwithstanding the enemy was beat back in every attack and our troops kept the field till 12 o'clock at night, we were under the necessity of leaving a great part of our wounded officers and men behind for want of sufficient waggons to bring them off. Lieutenant-General Knyphausen's column halted at sunset at a place called Nut Swamp, about two and a half miles from Middleton, where he encamped in nearly a circular form with his rear to Middleton.

June 29th.—Soon after General Clinton's division had joined the other, Major-General Grant was pushed forward to Middleton with the 1st and 2nd brigades of British, the 2nd battalion of light infantry and the 16th regiment of dragoons, and at 4 o'clock in the afternoon the Hessian brigades of Sterne and Walworth took the same route, followed at 5 by the park of artillery, provision train, and baggage of the army.

June 30th.—At 4 o'clock in the morning Brigadier-General Leslie's brigade moved forward and took post with their left to Shrewsbury river. The park of artillery also moved about 4 miles escorted by the brigade of Sterne, and about 10 o'clock in the evening the baggage was ordered from Middleton and followed by the troops who had taken post there the day before.

July 1st.—About daybreak the troops took up their new ground, which had been reconnoitred the evening before by the Quarter-Master-General, on the heights of Nave Sink forming a camp of nearly three fourths of a circle, the right extending to Sandy Hook Bay, and the left to Shrewsbury River, and thus covering the embarkation of the artillery, provisions, baggage, etc., and the transportation of the horses which commenced this day.

July 2nd.—The army continued in the same position on the heights of Nave Sink and the embarkation continued.

July 3rd.—It rained very hard the greater part of this day, the embarkation of stores and baggage, however, went on, as did the transportation of horses, first to Sandy Hook by swimming them over a passage of about 50 or 60 yards in breadth, which the force of the tide has lately made between the heights of Nave Sink and the peninsula on which the lighthouse stood, and which is now become an island, and from the Point they were transported to Long Island in small vessels.

July 4th.—This day also proved rainy, but did not retard the embarkation and it being determined to make a bridge on flat boats from the mainland to the lighthouse island, it was nearly effected this evening and completed the next morning.

July 5th.—The troops were under arms at 4 o'clock in the morning, and moved towards the sea beach in four columns, from which they doubled up, first into three, then into two, and finally into one, in order to cross the bridge, the passage of which they effected in about four hours and the bridge was broken down. The flat boats being ready to receive them, the embarkation began from the beach of the lighthouse island and was completed that evening, but too late for the transports to proceed to their respective destinations. The Commander-in-chief after having seen the passage of the troops to the lighthouse island effected and the bridge broke, came up to New York where he fixed his head-quarters.

The French, as soon as they had concluded the defensive alliance with the Thirteen Colonies, began to arm by sea. They fitted out at Toulon a squadron of 12 ships of the line and six frigates, which with a considerable body of troops on board, sailed on April 13th, under Comte d' Estaing for America. Contrary winds delayed its progress so that the coast of Virginia was not reached until the 5th July, the day on which the British army embarked at Sandy Hook. Meanwhile the English government equipped a fleet of equal strength, and in May despatched it under Admiral Byron to America.

We now return to Captain Downman's narrative, at the point where we left off.

CHAPTER V.

The army from Philadelphia arrives at the heights of Nave Sink. Cross over to New York. A French fleet appear off the coast. Anchors off Sandy Hook. Proceeds to Rhode Island. Manœuvres of the French and English fleets. Violent storm. Colonel Bolton's expedition.

June 28th, 1778.—I went to Jamaica, Long Island, to Colonel James. At 10 o'clock the same evening an express arrived and informed him the bomb vessels were ordered round to Sandy Hook to cover the embarkation of our army from Philadelphia. We set off directly to go down to the Narrows. We lost ourselves in a wood and did not arrive at Denyse's Ferry till six in the morning, where we got a boat and went on board the *Thunder* bomb, from whence we reached the *Carcass* bomb tender and proceeded to the Hook with a number of other ships.

June 29th.—Our army is arrived near the shore to the right of the Nave Sink. The flat and other boats are preparing to receive them.

June 30th.—Very early this morning the sick and wounded and baggage were embarked, also the artillery that formed the park, and all the provisions and other waggons. Our army has taken post on the commanding ground near the bay. They have had a most fatiguing march. They have not only had rebels to encounter, but intense heat and a general want of water, for the rebels cut the ropes of all the wells and filled them with rubbish, so that many of our men died raving mad.

From the 1st to the 4th July, 1778.—The artillery horses, etc., have been embarking. The horses with a great part of the army chiefly embarked from Lighthouse Point. The rebel army fired a *feu de joie* about 7 o'clock this evening, the anniversary of independence.

July 5th.—During the day the whole of our army embarked and the vessels proceeded towards the Narrows. The embarkation of our troops was not at all molested by Mr. Washington, who retired to some distance after the affair of the 28th of last month, the account of which is as follows :—

The action commenced after a march of eight hours at 12 o'clock on the hottest day imaginable. The British guards formed the rear of the army, the rebels insulting the flanking parties. At 11 o'clock the General reconnoitred the enemy, and finding them in force ordered a halt on the heights of Freehold, having given orders accordingly to the advanced part of the army on the march. The rebel battalions showing a disposition to stand, the Commander-in-chief ordered the rear of the army to join the front, and the light horse to advance and charge those in front of the wood leading to Freehold Court House, at the same time commanding the 1st battalion of guards to support the cavalry and follow the charge with bayonets. During the movement, while the guards were loading, the advancing cavalry received a fire from 300 of the enemy in a wood on the right[1].

One of the most fortunate events that attended the British army since their being in this country, was leaving Philadelphia and marching through the Jerseys, for there would have been so many delays attending the embarkation of an army, horses, etc., and in getting the fleet out of the Delaware, that before it could have been accomplished and the fleet could have arrived at New York, the French fleet would have taken possession of the river Delaware, and totally blocked us up. There we must have remained perhaps until we starved. What could we have done? If we had destroyed our transports, etc. and then marched through the Jerseys where could we have gone to? The French would undoubtedly have taken New York, there being no ships of force enough to have prevented their getting up.

July 12th.—A French fleet consisting of 11 ships of the line and some frigates came to anchor off the Nave Sink, Lord Howe remains in the Hook, his force too small to attack them. Admiral Byron with a fleet is expected every day, but until his ships or some others do arrive nothing can be done against them. They have taken the *Carcass* bomb tender that was driven out of the Hook by a hard wind. Lieutenant Garstin,[2] who succeeded Lieutenant Stephens[3] in that command, has lost everything he had in the world, and himself escaped with three men in a small boat. He had just taken the command, and while he went to Lord Howe to report the situation of the tender, then lying nearer the French than our fleet, they manned boats and took him. When were the British arms in such a situation as just now! An English army surrounded by that of rebels. An English fleet blocked by a French!

July 13th.—Colonel James and myself went down to the Narrows, and to Gravesend, and had a view of the French fleet. General Clinton has fixed his head-quarters for a few days at Mr. Denyse's. The 42nd and some other troops are encamped here.

July 20th.—Went to New York and paid Commissary Grant £30 sterling. Saw the Mingo Tyrant, he has allowed me to continue at Jamaica a little time longer for my health. The French fleet are still before our post, and have taken several prizes. The *Leviathan*, a 74, has been fitted up and manned in a few days by volunteers only. The masters, mates, and seamen in general have shewn much forwardness on this alarming occasion and have offered themselves to go anywhere Lord Howe may think proper to send them.

---

[1] This account ends abruptly, and was evidently intended to be carried to another page of the diary, but cannot be traced.

[2] Kane's List, No. 409.

[3] Kane's List, No. 403.

July 21st.—Returned to Jamaica. It is strongly reported that three companies of artillery are going to the West Indies. It is imagined to Jamaica to reinforce that island.

July 22nd.—The French fleet went this day from before our harbour, whether from an appearance of blowing bad weather, or from intelligence of Admiral Byron's being near, we are not able to determine. We are in great apprehension for the fate of a considerable Cork fleet which is expected daily. The loss of this fleet may be attended with fatal consequences.

July 24th.—Went to New York from Jamaica. For a certainty the *Cornwall,* a 74, one of Admiral Byron's fleet arrived upon the coast near the Hook, and the rest of them are hourly expected. It is reported the French fleet are gone to Rhode Island.

August 7th, 1778.—Lord Howe and his fleet sailed from the Hook in search of Mons. d'Estaing. It is imagined he has been joined by some of Byron's fleet, if so, the destruction of the French fleet is inevitable; they are now lying before Rhode Island, and we hear intend in conjunction with Washington's army to make an attack on that place. General Pigot, who commands there, has written to Lord Howe informing him of it, and says he has a garrison of good men all in health and spirits, in no want of provisions, and in no concern about the threatened invasion. Two of d' Estaing's fleet we hear have been very roughly handled by a battery of ours. About twenty transports with two frigates are gone up the Sound to the eastward, to be in readiness to take troops on board from Long Island, and away at once. The 16th dragoons are gone to Huntingdon on that island, the 17th lie at Flushing, and the light infantry and grenadiers, with four regiments are encamped at Bedford. General Tryon with some provincial corps has gone to the east end of Long Island.

In the night of the 9th, some rebel rascals set fire to the town of New York, and before the flames could be extinguished, 60 or 70 capital houses from Dock Street to Centre Market were consumed. On the 10th, a sloop lying in the east river opposite the coffee house, having on board 250 barrels of powder, was blown up, it is supposed by lightning. Fortunately only one person was on board. The shock was so great that almost every window in the town was broken, and the roofs of many houses damaged.

August 11th.—The wind began to blow about noon excessively hard from S.E., and continued with some variation for four days. We are under some disagreeable apprehension concerning Lord Howe, whether he has been able to act against the French, or whether his fleet has been dispersed by the storm.

August 15th.—We have just been able to learn the following account of Lord Howe.

"Lord Howe's fleet made the high land off Rhode Island, on Sunday the 9th of August at noon, and at 2 o'clock p.m. came in sight of the Light House; in about half an hour the masts of the French fleet could very plainly be distinguished anchored within the land. About 7 p.m. the British brought to and came to anchor off the mouth of the harbour, distance about five miles. The next morning, Monday the 10th, about 8 o'clock, a very severe cannonade commenced, which for half an hour at least we could not explain, and continued for two hours. At last we could plainly perceive the *Languedoc* (the French Admiral's ship) standing out of the harbour's mouth and the batteries on shore warmly plying her and the rest of the fleet then getting under way, and they returned the fire. As soon as Lord Howe observed the French fleet to be getting under way, he ordered the British to slip their cables, which was instantly effected and the whole were under an easy sail in a few minutes. His Lordship immediately directed the line of battle to be formed, the *Eagle* leading the van with no more than her main and fore topsails set and two top gallant sails on the cap, while the French fleet crowded all the sail they could carry. Lord Howe carried no more than the above described sail the whole day, with which he drew these perfidious Frenchmen off the coast, and that too almost imperceptibly for *no doubt very wise purposes.* His Lordship's approved abilities leave great room to form the most sanguine expectations. About 8 o'clock on Monday evening, the van of the French fleet was about a mile distant from the rear of the British. The French fleet consisted of 12 capital ships and two smaller, one of 90 guns, one of 84 and ten of 74. Lord Howe had with him only eight line of battle-ships, one of which is a 74, the others all 64's, and five of 50, and two of 44 guns, with some frigates and fire ships, galleys, etc. It was imagined that Lord Howe would engage the French fleet in the night that he might have a better opportunity of grappling them with his fireships."

The following is another account of the occurrences at Rhode Island.

"When the French fleet invested the place, the Comte d' Estaing sent a message demanding its surrender to the forces of the United States and the French vice-admiral. General Pigot answered it from the mouth of his artillery. A heavy cannonade from both sides succeeded, which lasted two hours, notwithstanding the Comte had pledged his honour with the rebel chief that he would in 25 minutes silence the British batteries. During the operations, the *Languedoc* by egregious bad management, swung round, presenting her stern to a battery of large cannon, several balls from which went through her fore and aft, in which position the lofty ship was raked without being able to bring a single gun to bear upon the battery. Therefore, under such an humiliating circumstance, the Comte, to save his ship from imminent destruction, found it necessary, with his squadron, to cut their cables and stand out of harm's way. The French fleet in general, but especially the large ships, were very much disabled, and their hands were employed two days in plugging the shot holes and patching them up for another voyage. On Sunday the 9th, the Comte entirely abandoned the enterprise against Rhode Island, left the harbour and proceeded to sea, and presently came in sight of the

British fleet. Early on Sunday morning following, the fleets were left within a very short distance of each other. The French lost a considerable number of men, and they landed a great many wounded. The batteries lost but one man. There came on a violent gale of wind about noon of the same day, which we fear has prevented his Lordship from engaging the enemy. This gale continued with great violence for three days blowing from S.E., or there about."

By a letter from St. Augustine we are informed that a body of rebels attempted that place, but were driven off with loss, and that a number of armed rebel vessels intending likewise to make an attack, are blocked up in St. Marie's river, 70 miles distant, by some English vessels.

In the evening, several men-of-war, supposed to be part of Lord Howe's fleet, came and anchored off Sandy Hook.

August 16th.—The *Isis* man-of-war of 50 guns, Captain Raynes, being separated by the storm from Lord Howe's fleet, fell in about 12 leagues from Sandy Hook with the French rear-admiral's ship of 74 guns. The Frenchman bore down on the *Isis*, and when near gave three cheers as if certain of her. The *Isis* answered her cheers with a broadside. An action ensued which continued for a considerable time, when the Frenchman was obliged to bear away and make his escape.

We hear from Albany that some time ago Colonel Bolton, with a detachment of the 8th Regiment, some friends to government and a number of Indians, assembled at Unadala in Tryon country, from whence they proceeded to the settlements of Cherry Valley, Springfield, and Anderstown and the back settlements of Schohary, where they destroyed about 300 houses, killed upwards of 170 rebels found in arms, drove off a great many cattle, seized a sufficient quantity of provisions to subsist the party, gave an opportunity to many loyalists to join them and returned to the place of rendezvous. Thence they proceeded down the Susquehanna river to Wyoming in the province of Pennsylvania, attacked that settlement, killed upwards of 400 rebels, being all that were found in arms, but spared the women and children and sent them to their rebel friends. Upwards of 5,000 persons fled in the utmost distress and consternation. The friends to government take arms and join Colonel Bolton's party, which increases fast and continues to spread terror on the western frontier of the province of New York, New Jersey, and Pennsylvania. The proceedings greatly alarm the leaders of the rebellion in the province of New York, who have lately passed an act to force the loyalists to abjure the British Government. In consequence, an oath is tendered to those most notoriously attached to government, but they reject it with disdain, and will be obliged unless soon relieved to abandon their families and property and attempt to return within the British lines.

The following reveries, by way of address to the inhabitnts of Connecticut, have been handed about by a rebel officer and have had great effect upon the minds of the people.

To all Americans who are Jealous of their Liberties.

" What a situation have we brought ourselves to ! Not till now have we had a convincing proof of the tyrannous sway we are to expect. Have we been fighting to support Washington, to establish him an absolute tyrant? He writes to Congress that he obtained a victory on the 28th of June. Congress obsequiously thanks him as the Senate did Tiberius. What was the victory? Being beaten back as often as we advanced, a few wounded men and officers unable to be removed are prisoners. It is a notorious falsehood Washington! Adulatory, obedient Congress, born to be slaves! Vile Senate! Infatuated Americans! Washington, the General, the man of honour and veracity can make you believe that black is white, victory defeat, that is, compel your grateful Congress to vote him thanks for nothing, and we deluded people must be gulled by it. Awake Americans! awake! It is now you are losing your liberties. I appeal to every American officer, the General excepted, if this was a victory, and if any man was more active, or in a more dangerous situation than your real friend on that day,"

(Sd). A Colonel in the Continental American Army.

August 18th.—We are told by a vessel just arrived that eight sail of Comte d' Estaing's fleet, one of which is dismasted, are at anchor off Cape May (Delaware). Lord Howe with all his fleet are arrived at Sandy Hook. He had much better be looking out after the Frenchmen. It will hardly be believed that 15 two-deckers, eight of that number of the line, eight frigates, two bombs, three fire-ships, four galleys, and four armed sloops, all well manned, in great spirits, all Englishmen, and commanded by Lord H., should run away from a French fleet of 12 line of battle-ships. Believed or not, 'tis truth! On Monday, the 10th of August it happened off Rhode Island, on a very fine day, with a gentle breeze and smooth sea, and with ships that could sail faster than the enemy's. From 9 o'clock in the morning till 8 o'clock at night did his Lordship bear the mortification of being driven by Frenchmen, and even on Tuesday, before the gale came on, the two fleets were together, and yet no fighting—tis wonderful! tis passing strange!—and what excuse he can make for such unaccountable conduct is not easily to be comprehended.

Since writing the above it appears that Lord Howe would undoubtedly have engaged the French fleet on Monday, if he had been to windward, and as he could not attack them with any hope of success unless he had that advantage, he kept going on not doubting but he would have his wish in the morning following. He had hoisted his flag on board a frigate and prepared to engage when the gale came on and separated both fleets. A list of his Lordship's fleet follows.

Cornwall,	74 guns		*Raisonable,*	64 guns	*Phœnix,*	44 guns	
Eagle,	64 ,,		*Preston,*	50 ,,	*Venus,*	36 ,,	
Trident,	64 ,,		*Isis,*	50 ,,	*Richmond*	32 ,,	
St. Albans	64 ,,		*Centurion*	50 ,,	*Pearl*	32 ,,	
Somerset	64 ,,	32-pr.	*Renown*	50 ,,	*Apollo*	32 ,,	
Ardent	64 ,,		*Experiment*	50 ,,	*Vigilant*	20 ,,	24-pr.
Nonsuch	64 ,,		*Roebuck*	44 ,,	*Sphinx*	20 ,,	

Daphne 20 guns.	*Strombolo.*	Fire ships.	*Thunder.*	bombs and two tenders.
	Vulcano.			
Nautilus 18 „	*Sulphur.*		*Carcass.*	

Four galleys, three armed sloops, one armed schooner.

The *Thunder* bomb is missing, supposed to be taken by the French, or lost. Nothing could happen more fortunate for them, for some time ago they took the *Carcass* bomb tender, so that they now have two sea mortars and everything necessary for them. The *Ferret*, galley, Captain O'Brien, was cast away on the Jersey coast, and all the crew made prisoners by the rebels.

Five of our frigates, two sloops of war, with some transports and three galleys were burnt at Rhode Island to prevent their falling into the hands of Mons. d'Estaing. We are very fond of burning what we should not.

(To be Continued).

THE TEACHING OF MECHANICS BY EXPERIMENT.

(*ILLUSTRATED WITH EIGHT FIGURES*).

BY

J. A. EWING, ESQ., F.R.S.

Professor of Mechanism and Applied Mechanics in the
University of Cambridge.

A Lecture delivered at the Royal Artillery Institution, Woolwich, Thursday, Feb. 10th, 1898.

MAJOR P. A. MACMAHON, R.A., F.R.S., IN THE CHAIR.

THE CHAIRMAN—Ladies and gentlemen, I have much pleasure in introducing to you the lecturer of this evening, Professor Ewing, F.R.S., of the University of Cambridge, where he holds the post of Professor of Engineering. He is well known in engineering circles; he is an expert, one may say, in many departments of the subject, in most branches of civil engineering, mechanical engineering and of electrical engineering, particularly electrical engineering. He has written a great many scientific papers, and it would be quite safe to say that in more than one department at the present time he is the greatest living authority (applause).

PROFESSOR EWING—Major MacMahon, ladies and gentlemen, in the teaching of science the last quarter of the nineteenth century has seen many changes. Perhaps none of these is more conspicuous than the favour now shown to the laboratory method. At the time when those of us now in middle life were at school it was, apparently, considered reasonable and proper to give instruction even in such subjects as chemistry and physics simply by the spoken or written word, with perhaps the aid of a few lecture-table experiments. Some of us, perhaps, were fortunate enough to learn to interrogate nature for ourselves in the domestic attic or cellar, with no more elaborate apparatus than could be obtained by spending a part of our pocket money in some neighbouring chemist's shop. It would have surprised us then to be told that the joys snatched in such a way, casual and perhaps surreptitious as they were, did more than all the lessons of the schools to form our intelligence in scientific matters, and to give us a real hold of the foundations of physics and chemistry. The boy who begins the study of these subjects now-a-days is in a very different case. Unless he has been specially unfortunate in his school, he finds that the doors of a more or less lavishly equipped laboratory are open to him. He has no longer to be content with natural knowledge told at second-hand; he is brought face to face with *things*. Going on from school to the University he there finds the laboratory method in its highest degree of development. The systematic exposition of any branch of science given in the lecture room is followed by time spent in the laboratory, where under the direction of "demonstrators" the student himself carries out experiments designed to make the truths learnt in the lecture room vivid and real. His knowledge of principles acquires a new meaning, it takes form and substance when it relates to matters that his eyes see and his hands handle. In students of the best kind laboratory training engenders habits of observation and of independent thought, but even in the average youth it at least does something to foster exactness and to make the dry bones of a science marshal themselves and start into life. The old conception of a laboratory reserved it as a place of research for the trained specialist; the new conception of a laboratory makes it an instrument of education even for the rawest student, while it still remains no less a place of research.

My own work as a teacher deals with engineering and with applications of physical and mechanical science to engineering. In this subject, as much as in any, the development of the laboratory method has wrought a profound change. The introduction of engineering laboratories was mainly due to the initiative of a single teacher, Professor Kennedy, who established one at University College just twenty years ago. Professor Kennedy has now relinquished professional work, but his influence as a teacher survives not only in the laboratory he himself formed, but in many laboratories which have been formed on the same general lines in other engineering schools.

In the engineering laboratory created by Professor Kennedy, and in most of the laboratories that have been modelled upon it, the experimental work which the students are set to do was mainly directed along two well defined lines. One of these was the testing of the strength and elasticity of materials, and the other the testing of a steam engine to determine its consumption of steam and of coal in relation to the power developed. The chief pieces of apparatus were the testing machine and the experimental engine and boiler, though these were often supplemented by other appliances dealing with special problems in applied mechanics. Both these two lines of work have a very direct practical bearing on the questions with which an engineer has to deal professionally, and they naturally continue to take a conspicuous place in the scheme of any engineering laboratory.

But I wish to speak to-day of other experiments of a less highly specialized kind, experiments which are useful not only to engineers, but to all students who wish to gain clear concrete conceptions of what mechanical principles really mean.

Broadly speaking, there are two ways of treating the science of mechanics. One way is to regard it merely as an exercise in mathematical deduction. The other way is to regard it as a means of solving real problems presented by real things.

In either case you start from certain first principles, which are fruits of experience, principles such as Newton formulated in his three laws. But after that the purely mathematical student of mechanics leaves experience severely alone. He concerns himself only with mathematical deductions, lives in an ideal world of inextensible strings and smooth pegs, and if he ever comes near enough to reality to sketch a screw it is such a screw as was never seen out of a text-book.

On the other hand if you approach the science of mechanics from the stand-point of the engineer, it is your endeavour, at every point of the logical process, to keep in touch with real things. The science is no less a logical deduction from first principles, but every step is felt to be an advance in the comprehension of matters of every-day experience. As the student pursues his study he remains consciously and continuously in the world of sense. He expressly avoids soaring into the cloudland of abstractions.

To my thinking, this is the better way, and there can at least be no doubt that for the engineer and for the artillery officer it is the only rational way. Experiment forms a powerful aid in this method of studying mechanics.

The title of my lecture must not be understood to imply that experiment is anything more than an aid in that study. I do not mean that it is through experiment that the truths of mechanics are to be learnt. No one would endeavour to establish the truth of the principle of the triangle of forces by pulling a body with two strings and then finding how a third string must pull to produce equilibrium. But a simple experiment such as that is of value in fixing the principle in our minds and in making us realise that it has application to common things. And the argument for experiment becomes stronger when the mechanical principle involved is of a more recondite kind. Experiments in mechanics illuminate the subject by acting as an aid to the imagination. They supplement the fruits of experience to which, consciously or not, the student of statics and dynamics naturally refers for the support and illustration of his deductions.

There is of course nothing new in this notion. It is as old as the study of mechanics itself. Galilee and Newton did not disdain the aid of experiment in fixing their mechanical concepts : each of them describes experiments which had this intention. And to go further back we all know how much Archimedes owed, and admitted he owed, to an experiment while he was struggling to solve the problem of finding the specific gravity of an irregular solid. He was able to cry εὕρηκα only when he made the simple experiment of taking a bath. The advantage of experiment has been present to the mind of many a teacher. That tutor of Trinity who flourished a century ago and whose name is immortalised as the inventor of "Atwood's Machine" must have been conscious that the equation which expresses the motion of a body under uniform acceleration gains something of meaning and point by such a concrete presentation. And to take a more recent example, Sir Robert Ball has shewn in his book of Lectures on Experimental Mechanics how much may be done by means of quantitative experiments performed on the lecture table to make the subject intelligible to people with little or no mathematical training.

Of late years the idea has been steadily gaining ground that even a systematic and more or less mathematical exposition of mechanics gains much when it is accompanied or followed by experiments which the students perform themselves. This has led to the creation of mechanical laboratories and to the addition of experiments in mechanics to the work of existing laboratories of physics or of engineering. In some cases, as at the Central Technical College, where Professor Henrici has done much to show the value of this kind of teaching, the mechanical laboratory is separate. In other cases it has grown up within and forms part of a laboratory of engineering. A notable example is to be found in the City and Guilds Technical College at Finsbury. The work done there by Professor Perry has been of a peculiarly important and suggestive kind and it is to him perhaps more than to any other teacher that we owe our present knowledge of what may be done and what should be done in the teaching of mechanics by experiment. I have myself found his example contagious, and have to acknowledge receiving much help from the little book on "Practical Mechanics" in which he originally expounded his method of teaching. No writer insists more strongly on the value of a constant appeal to experience and on the advantage of quantitative experiment as a means of acquiring experience.

In the new engineering laboratory at Cambridge mechanical experiments take a prominent place, and we have not hesitated to copy or adapt from any quarter whatever seemed likely to form a useful addition to the stock of experimental apparatus. My purpose in this lecture is to give you some idea of the scope of such experiments and to bring before you a few representative examples of the apparatus with which they are carried out. The first thing a student has to do in a mechanical laboratory is to learn something of the art of measurement, the measurement especially of mass and time, of length and area. The measurement of long lengths is part of his field work in surveying, if he is a student of engineering, but the measurement of short lengths is part of his laboratory work. He learns how to read off lengths by an ordinary scale, estimating to tenths of the smallest divisions marked on the scale, how to use beam compasses and calipers, screw micrometers working by touch, micrometer microscopes, the spherometer, the cathemometer and so forth. He learns to use and test the planimeter as well as to measure areas by other means. He learns of course the use of the balance and how to find specific gravities. In connection with his length measurements he uses an optical lever such as that shown in Fig. 1.

Fig. 1. Optical Lever.

This is the same in principle as the optical lever described in various text-books on practical physics. A small three-legged stool carries a mirror; its two front legs rest respectively in a hole and in a slot, while the third leg rests on a plane surface at the back. The body whose thickness is to be determined, say a metal plate or a piece of glass, is put under the back leg; this tilts the mirror, and the amount of the tilting is measured by observing in the reading telescope the reflection from a mirror of a fixed vertical scale. In this way the student learns to make a survey of the thickness of the plate and he compares the thickness so determined with measurements made by means of a screw micrometer and otherwise. It will be noticed that this optical lever is entirely self-contained; the reading telescope and scale are carried on the same stand as the mirror. This is a feature of considerable practical advantage in a laboratory, especially when many pieces of apparatus have to be used. Where the space is small and the number of students is large it is desirable that each piece of the apparatus should be, so far as possible, a self-contained whole, which may be at once set on the table ready for use. The same feature will be noticed in most of the other pieces of apparatus I have to bring before you.

Passing now to experiments by help of which the principles of statics may be exemplified quantitatively, we get quantitative examples of the composition of forces in an apparatus in which three cords are attached to a small ring, one of the ends being directly loaded by weights, while the other two are loaded by weights on cords which pass over pulleys. When a triangle is sketched with its three sides parallel to the directions taken by the three cords with the weights in equilibrium, the lengths of its three sides will be proportional to the three forces. The apparatus is mounted on a vertical board covered with squared paper. The co-ordinates along each cord between any two points are read off and in that way the tangent of the angle of inclination of the cord is determined. Having observed these inclinations, the student transfers the directions of the lines to his drawing board and he then proceeds to draw the triangle, to measure its sides, and to compare them with the known values of the forces. He finds that there is some uncertainty on account of the friction of the pulleys, and that the ring to which the cords are attached may be made to take up its position anywhere within a certain limited range, and by examining the possible range he finds the place which it might be expected to stand in if there were no friction. Another experiment of the same kind is the funicular polygon, formed by mounting a cord on a similar board and hanging loads from it at certain fixed points. The form of the polygon is again determined by help of the squared paper behind, and is transferred to the drawing board, after which the diagram of forces is drawn and the segments of the load-line are measured and compared with the known weights.

The inclined plane is another simple piece of apparatus giving experiments in the resolution of forces. A sloping board forms the plane and a block rests on it with pieces of wire between to serve as rollers. This nearly does away with friction between the block and the plane. A weight is then applied to the end of a cord which passes over a pulley at the top of the plane, and is adjusted until any small increase of it causes the block to rise and any small decrease of it causes the block to descend. The component of force along the plane, measured in this way, is compared with the value calculated from the observed inclination of the plane. By leaving out the rollers the student can use the same apparatus to make experiments on the coefficient of friction between the block and the plane.

To investigate the friction between a cord and a drum or pulley, a convenient and simple apparatus, Fig. 2, is formed by clamping a pulley against a board covered with squared paper, supporting the board vertically, and putting a cord over the pulley. One end of the cord carries a hanging weight, the other end passes over a loose guide pulley which can be attached at any part of the edge of the board, and carries another weight. Either weight may be raised until the cord slips over the clamped pulley, and the angle of contact may be altered at will. The magnitude of the angle is found by help of the squared paper, which allows the inclination of the cord to be read off.

The principle of moments finds quantitative illustration in experiments made with a steel yard and also with a graduated beam loaded at various points along its length and supported at the ends on two spring balances or small platform balances. Similarly the moments of a system of inclined forces can be made the subject of experiment by means of a horizontal board or platform pivoted on ball bearings and pulled in various directions by cords which pass over pulleys and carry loads.

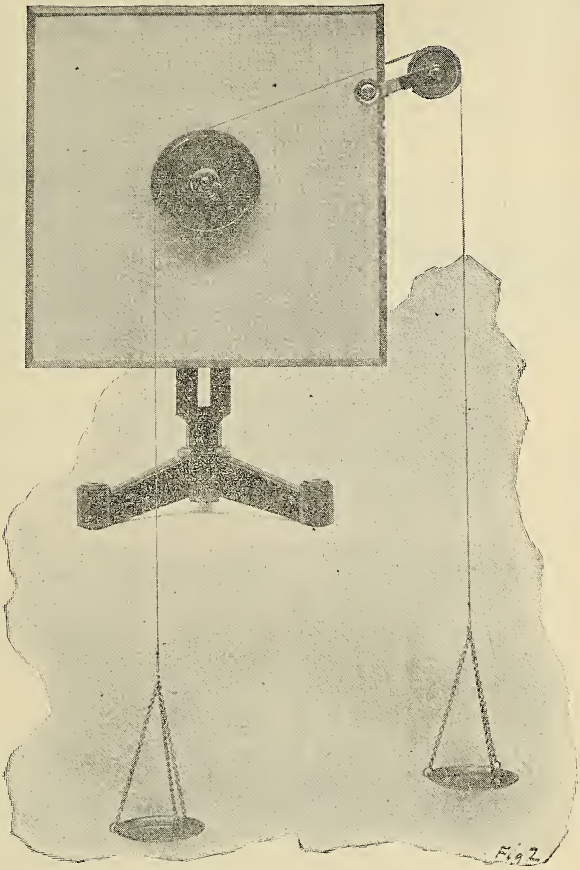


Fig. 2. Apparatus for friction of cord on drum.

Turning now to kinetics, I think it is the almost uniform experience of teachers that the student has more difficulty in grasping the fundamental conceptions in that subject than those of statics, and it is therefore all the more necessary to provide ample experimental illustration. Atwood's Machine, already mentioned to-day, is a device of great service in assisting a student to grasp the relation of acceleration, force and mass. In most forms of Atwood's machine the pulley at the top is made exceedingly light, and the effect of its inertia is intended to be neglected. I prefer to use a substantial pulley and to tell the student what is the equivalent mass, which, moving with the cord, would have the same inertia.

Atwood's machine has been described as a device for diluting gravity. Fig. 3 shows another apparatus which also dilutes gravity and gives further useful lessons in uniformly accelerated motion. It is substantially the experiment by which Galileo satisfied himself as to the character of uniform acceleration, namely, by letting a ball roll down an inclined groove.

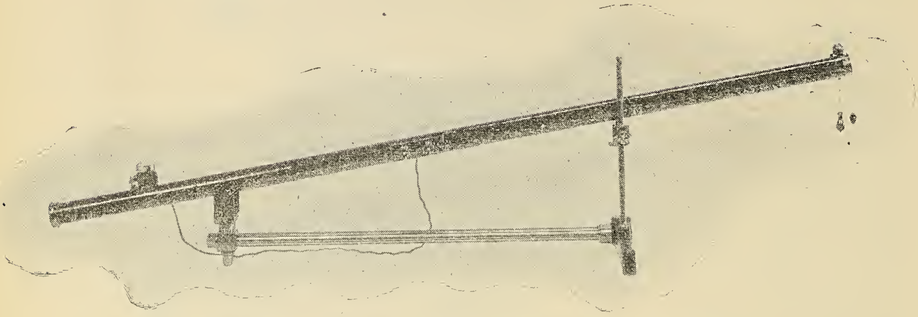


Fig. 3. Ball rolling on inclined railway.

Here the groove is formed by planing out a portion of a stout steel tube. A ball such as is now readily obtained for the purpose of ball bearings will do well. Placing it at the top against a trigger we are able to release it and at the same time to make an electrical signal upon any form of chronograph, showing the instant of its release, and when it reaches the end of its course it hits another trigger which makes tke second electrical signal. The chronograph then shows electrically the interval of time that the ball has taken to roll down the plane. We may vary the distance that it rolls down the plane by setting the stop piece at various places along the groove. We may also vary the inclination of the path itself by raising or lowering a bracket on which one end of the grooved tube rests. A waterclock makes a convenient chronograph, or the record may be made by a Morse telegraph instrument reeling off paper at a nearly uniform rate. The length of the line printed in ink upon the paper will show the duration of time that the ball has taken to roll down, for the current is made when the ball is released and broken when it reaches the stop.

What the student does is first to investigate experimentally the relation between the length of the path and the time taken, and he finds that one is proportional to the square root of the other. He takes the time and the square root of the distance as his co-ordinates for plotting on squared paper, and he finds they give a straight line which however does not pass exactly through the origin but cuts the axis of time a short distance away from the origin. That gives him the clock error due to time-lag in the mechanism of the chronograph: in the particular instrument that I am using at Cambridge the clock error is about $\frac{1}{40}$th of a second, and it is determined with very considerable accuracy by seeing how near the straight line connecting these quantities passes to the origin.

Another experiment in elementary dynamics, intended to illustrate simple harmonic motion, is arranged by having a weight hung from a spiral spring the suspension being carried through a graduated steel rule which allows the amount by which the spring extends to be read by a telescope. This is conveniently made self-contained : the telescope is attached to the same stand as carries the loaded spring. The student verifies Hooke's law and determines how much extension is produced by a given load ; he then sets the weight vibrating and observes the record of vibration and from these two observations taken together he can work out the value of " g."

Another simple dynamical experiment of great value is the determination of the period of oscillation of a simple pendulum and the comparison of it with the period of another pendulum of the Kater type. The simple pendulum consists of a small ball hung by a thread. The other is a solid rod suspended on a knife-edge and capable of being suspended on another knife-edge near its other end, and carrying a weight clamped on it The weight on it is divided into two parts whose positions are separately adjustable by means of screws. The student adjusts them until the period about one knife-edge is the same as the period about the other knife-edge, and he then observes that the distance between the knife-edges is equal to the length of the simple pendulum when that is regulated so as to vibrate in the same period.

This apparatus shown in figure 4 is a species of compound ballistic pendulum or balance. It consists of a heavy horizontal beam

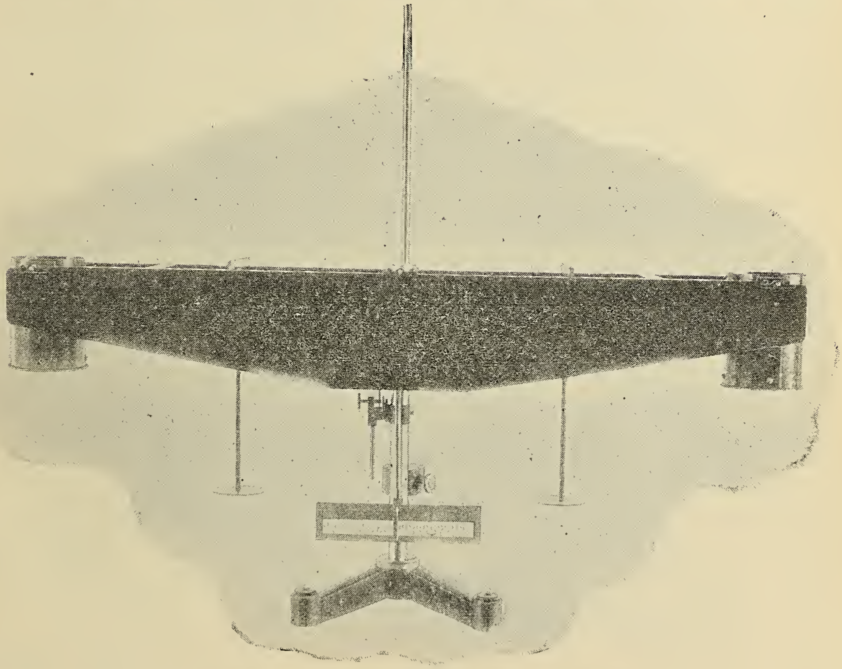


Fig. 4. Compound Ballistic Balance.

supported on a central knife-edge and carrying at its extremities two pots or buckets which are themselves connected to it by knife-edges. Its stability can be adjusted by sliding a weight up and down a vertical rod which is attached to the beam. Its deflection can be read by means of a pointer upon a scale below and its period can of course be observed. The student measures the moment of inertia of the oscillating system in the first instance. There are two methods by which he may do it. One is to take the period as it swings and then after that is done to place known equal masses in each of the two pots at the ends of the beam and then again take the period, and by comparing the two periods and knowing the amount of mass that has been added he is able to determine the moment of inertia. This is because the knife-edges on which the beam itself is suspended and those on which the pots are suspended are all in one plane, so that the addition of the masses in the pots does not affect the stability of the apparatus but only affects its moment of inertia. Another method by which he may do it is to take the period and then put a small weight in one pot only and observe the statical deflection to which it gives rise : from those two observations he has the data needed to work out the moment of inertia. Having found the moment of inertia he can use the apparatus ballistically by dropping a mass from a height into one of the two pots; but a mass dropped into one pot only would produce a double effect, namely a dynamical effect and a statical effect, and in order that the statical effect should be prevented it is necessary that the other pot should beforehand be provided with a mass of the same weight. So I put in the first instance into the other pot a mass equal to the mass which is presently to be dropped into the other pot. It tends of course to deflect the beam. That deflection is prevented by its being brought up against a stop, but the stop is so arranged that when the beam begins to swing the stop falls away and the beam is left perfectly free. A weight is now suspended from the stand at a definite height and allowed to drop in. The stop which held the beam from

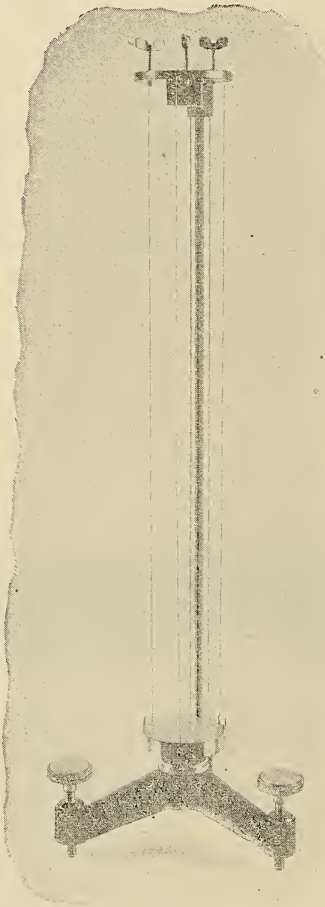


Fig. 5. Tri-filar Suspension Table.

deflecting now automatically removes itself. The beam swings, and by observing the angle of deflection in the first swing the student can determine what the velocity of the body must have have been when it fell into the bucket.

Fig. 5 shows an apparatus which allows the moment of inertia of rods and other bodies to be measured experimentally. It consists of a brass cylindrical disc hung by three wires,—a tri-filar suspension. Its own moment of inertia is calculated from its measured weight and dimensions. It is caused to swing in azimuth, and its period is observed. Then the body whose moment of inertia is to be determined is placed upon it, and the period is again observed. The stability of the system is increased in proportion to the increase of weight. But knowing the weight of the added body as well as that of the disc, and knowing also the two periods of swing, with and without the added body, we have all the necessary material for working out the moment of inertia of the added body.

Fig. 6 is an apparatus meant to illustrate the important subject of balancing, especially in relation to a locomotive or other engine. Here we have four discs which are set on a central axis and revolve with it. They are capable, however, of being shifted into any positions along the axis and also of being turned round separately through any angle. Weights are attached to them near the periphery of each disc and the system is set in motion by means of an electric motor. The whole system, motor and all, is suspended on a frame

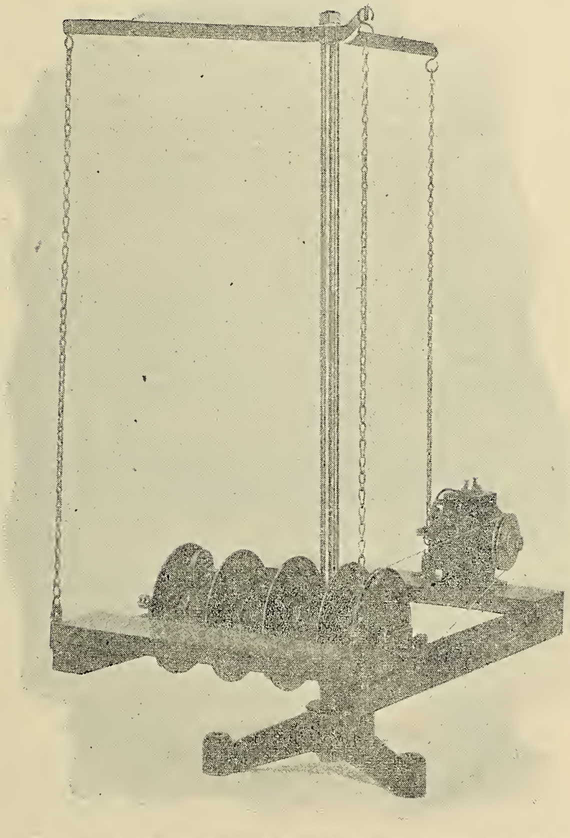


Fig. 6. Apparatus for testing balance of revolving machinery.

carried by three chains. It is free to oscillate, and if the balance is not perfect it will oscillate when the motor is set to work. You observe that the discs are revolving at a rapid pace, but there is no oscillation. This is because I have previously placed the weights in such positions as to get practically a perfect balance. But if I remove one weight leaving the others unaffected the balance is disturbed and you now see that the frame wobbles violently when the current is turned on.

Another group of mechanical experiments of great educational value are experiments relating to the measurement of power. One measures the power of engines, of electrical motors, and so on, most usually by means of an absorption dynamometer, and for small powers no form of absorption dynamometer is more convenient than a simple rope brake embracing the wheel. In other experiments one occasionally has to measure power on its way to a machine; one may wish for instance to measure the power which is required to drive some particular piece of machinery such as a lathe. The most convenient way of doing that, where practicable, is to drive the machine from an electric motor and to mount the motor on a cradle supported on knife edges so that the axis of the motor's pulley is in the line of the knife edge. If the belt coming away from the pulley to drive the machine is exerting equal pulls on both sides, then there is no tendency on the part of the cradle to be tilted, but as soon as the belt is doing any work it must pull unequally on its two sides and consequently the cradle tends to become tilted by the greater tension of the driving side of the belt. That tendency to tilt has to be met and counterbalanced by hanging weights to the end of an arm which comes out at right angles to the axis of suspension. By observing how much weight must be placed there to prevent the cradle from tilting we make a direct measure of the mechanical moment which is being exerted by the belt, and then by counting the number of revolutions also we see how much power is being given off. I have lately been applying this particular method of measurement to rather an interesting case, namely to measure the power absorbed in the rolling of a bicycle wheel. In a bicycle wheel there is a definite rolling resistance due to the imperfect elasticity of the tyre. This is very much less in the pneumatic tyre than it used to be in the cushion tyre, but it is greater in some pneumatic tyres than in others. When a bicycle wheel loaded with a weight is made to revolve, work is spent upon it. A small part of this work is spent in over coming the friction of the ball bearings, but much the greater part of it is due to the imperfect elasticity of the tyre itself. If you are in the habit of coasting you may, perhaps, have noticed that when two or more riders start fair from the top of a hill and come down without using the pedals one arrives at the bottom before another. That is because one tyre differs from another in its rolling friction. I have experimented with different tyres and have found that in some cases the ratio is as much as 2 to 1; it depends upon the particular material with which the tyres are lined. But this is a digression from the main subject of the lecture, and is only mentioned as an illustration of the kind of use to which a mounted motor forming a dynamometer may be put.

There is no time to speak in detail of experiments on hydro-mechanics or on heat. In hydro-mechanics one makes laboratory experiments on the friction of fluids in pipes, on the discharge of fluids through orifices and over weirs, on the pressure of jets against fixed surfaces.

Many instructive experiments may be arranged in the subject of elasticity, in addition to the experiments which are commonly performed by means of a large testing machine. The measurement of Young's Modulus of elasticity in a stretched wire may be easily enough effected by hanging up a long wire and measuring its extension directly by means of a scale, which is loaded with weights. Or we may use a shorter piece of wire and measure the extension by letting the wire to be stretched be hung alongside of another wire which is kept taut by a considerable constant load, the two hanging from the same support. Let a little platform be clamped to each and let a small three-legged stool rest with two feet on one of these platforms and the other foot on the other platform, and let the stool carry a mirror, the deflection of which may be read by means of a telescope. The deflection of the mirror takes place of course in altitude not in azimuth. We have thus a means of seeing by what small distance the wire is extended when each successive increment of load takes place. I make this piece of apparatus self-contained, the reading telescope, the wires and all being attached to one frame.

Fig. 7 shows a self-contained apparatus for exhibiting the elastic

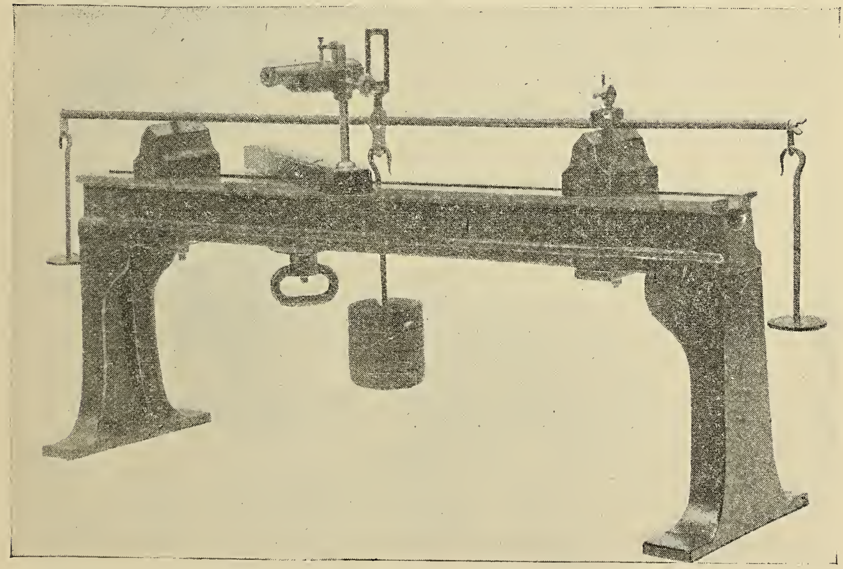


Fig. 7. Apparatus for Elastic Bending of Rods.

bending of rods. The steel rod to be experimented upon is supported by two knife-edges and is loaded at its ends, at two points equally distant from the two edges. If the loads at these two points are equal then the part of the beam which lies between the two knife-edges is subjected to a uniform bending moment; it consequently bends into a circular arc, and the amount of rise in the centre is read by means of a reading microscope. The beam can also be loaded in the centre in the ordinary way. A small mirror fixed to a vice which clamps on any portion of the beam serves to measure the angle of slope by means of a reading telescope and reflected scale.

Fig. 8 shows a self-contained apparatus for the purpose of experimenting on the torsional rigidity of wires. A wire is suspended from a fixed support at the top, and hangs down through the tubular stem of the apparatus. Hanging from it is a weight in the form of a turned brass drum. A cord is passed round the drum and carried over pulleys that are fixed alongside and are as free of friction as possible. By applying equal weights to the two ends of the cord the wire is twisted by a pure couple. Its torsion is read by means of a pointer running over a circular divided card. Static experiments are made in the first instance by applying various amounts of equal load to two ends of the cord, and after these static experiments the cord is removed and the brass drum is used as a torsional oscillator. The drum is heavy and its moment of inertia can be readily calculated from its known dimensions and weight. The student observes the period of torsional oscillation and so obtains data to work out the modulus of rigidity and to compare the kinetic with the static modulus.

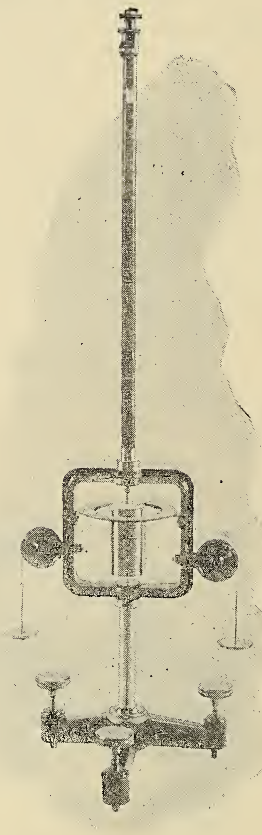


Fig. 8.—Apparatus for Torsion tests.

It would be easy to cite further examples, but enough has been said to show how we may proceed in using experiment as an aid to the teaching of mechanics. I do not know whether, from the point of view of the higher flights of mathematical mechanics, experiments may not, perhaps, be a mistake. It is possible that a mathematical genius of sufficient capacity might find that any appeal to practical matters or real things was only a clog on his wings. But for the average student, and especially for the student who intends to put his mechanics to some practical account, there is beyond any question a very real advantage in experiment. What I have been saying may have reminded you of a celebrated teacher who proceeded as he himself said upon the practical method. In "Nicholas Nickleby" we are told how Mr. Squeers taught the boys how to spell "winder" and then made them go and clean it; how to spell "bottiney" and then weed the garden. There is a great deal to be said for this; but, in Mr. Squeers' hands, the laboratory method had two serious drawbacks. One was that the book-work, the work of the lecture room, was badly done; the other was that there was no sufficient connection between the book-work and the laboratory work, for there is no essential connection between the spelling of window and the cleaning of it. But I submit there is a connection between the mathematical exposition of a mechanical principle, and the experiment by which that mechanical principle is directly illustrated. Of course the system is liable to abuse, and the student may, perhaps, make the mistake of supposing that the quantitive experiment is what really proves to him the proposition. It does not do that, and if that is the basis on which he is learning his mechanics, he is learning it quite unsoundly. The quantitive experiment is only intended to enforce the proposition, to make it real to his imagination and his intelligence. There is a danger, possibly, of the laboratory method getting a little overdone in some branches of teaching, and if this should ever happen what one would then have to insist upon would be the paramount necessity of systematic training from the mathematical point of view, At present however, I think that in the teaching of mechanics we may safely emphasise the advantages of experiment.

DISCUSSION.

The Chairman: I am sure you would be glad to hear any remarks that anybody will be so kind as to make. I will call upon Major Von Donop.

Major S. B. Von Donop, R.A., Professor of Artillery, Royal Military Academy, Woolwich:—I think all of us present here this evening may congratulate ourselves on having listened to a most instructive and interesting lecture, and I think that this lecture, when it is published, as it will be, no doubt, in the "Institution Proceedings", will be of the same benefit and instruction to those Officers who have not been able to be here this evening, as the "Proceedings" are sent to all quarters of the World.

This subject of mechanism has of late years become a very important branch of the Science of Artillery. We have only to walk into one of our coast forts, or those of us who live at Woolwich to walk down to the Arsenal to see what I may call the triumphs of engineering skill that are now made and issued to us to look after and to work with. Anyone might have seen a few months ago down at the Arsenal a modern mounting for one of the latest type breech-loading guns; and going up to that mounting one was able, (although mounting and gun weighed something like fifty tons), with one arm and using as I might say only the wrist power of that one arm, to traverse the whole of this mounting and gun round with the greatest facility and the greatest ease. When we consider that officers in the artillery have these excellent pieces of mechanism entrusted to their charge to keep in order, to superintend the practical working of and to instruct their subordinates how to manipulate them, I think that we owe a debt of gratitude to any one who will come here and show us the process, as Professor Ewing has shown us this evening, how to carry out experiments with these pieces of mechanism without soaring, as he expressed it, into the higher regions of mathematics. It is a fact that most of us have attained a certain standard of mathematics in our time and it is also a fact I am afraid that most of us have forgotten a great deal that we had learned on that subject, and therefore when an officer finds one of these pieces of mechanism entrusted to his charge and he has forgotten all about mathematics or a large portion of the mathematics that he used to know, he is apt to put it at once on one side and to say, I will have nothing to do with this; I do not understand it; it is a complicated piece of machinery and I cannot be bothered with it.

I think that mechanism is now a subject that ought to be studied by officers of the artillery to a larger extent than it is at present.

Professor S. Dunkerley, M.Sc.: I should like to express, as a teacher of mechanics, my entire agreement with nearly everything that Professor Ewing has said; but perhaps before making a few remarks there is one piece of information which I hope Professor Ewing will give us. He has apparently been making experiments on bicycle tyres. Now I am sure we are all most interested in bicycle tyres, I know that I am because I am thinking of buying a new bicycle and I should like to know which is the best form of tyre to buy (laughter).

As Professor Ewing has pointed out there are two methods of teaching the subject of applied mechanics; one is by means of a piece of chalk and a blackboard and the other is to supplement the lecture by means of laboratory work. Professor Ewing's lecture is particularly interesting to me at the present time because at the Naval College at Greenwich the subject of applied mechanics is taught entirely by means of chalk and a blackboard. The only advantage so far as I can see, that such a system possesses is that it saves the teaching staff an enormous amount of trouble, of that of course there can be no doubt. At the same time the fact remains that when one is appointed to an independent position, one's desire is to possess a laboratory which will excel any other laboratory in the Kingdom, and if the opportunity ever arises at Greenwich I know I shall have my work cut out to excel the laboratory that Professor Ewing has got together at Cambridge. But the disadvantage and great danger in attempting to teach applied mechanics without the aid of a laboratory is, as Professor Ewing has pointed out, that the whole subject becomes unreal. I cannot conceive any worse training (I am not now referring to officers but to boys) than to go from school to a college in which the subject of engineering is taught entirely by lecture. At the end of a three year's course the subject must have of necessity become very unreal. If the boy or the man has been through the shops before he goes to college the subject must necessarily be more real than in the previous case. But in all cases whether a man has been through the shops before he goes to college or has come straight from school, I think there can be little doubt as regards the advisability of mechanical laboratories; always remembering that a mechanical laboratory is, in no sense, a workshop—a distinction very frequently overlooked.

At Cambridge where I was fortunate enough to be Professor Ewing's assistant for a short space of time, Professor Ewing possesses greater opportunities than, I think, any other Professor of Engineering and, what is more to the point, he is making greater use of those opportunities than perhaps any other single individual could do. All the apparatus which Professor Ewing has brought with him and shown on the screen, and which bear evidence of such very careful design, has been made entirely under his supervision in the workshops at Cambridge, and such a condition of affairs is possible because his department of engineering at Cambridge, like all his apparatus, is self-contained. The engineering department at the ordinary college is not self-contained. The Professor of Physics teaches the engineering students to a considerable extent and would probably look with jealous eyes upon a great many of the mechanical experiments that Professor Ewing has described to us to night. That possibly accounts for the difference between the ordinary laboratory and Professor Ewing's laboratory at Cambridge. As Professor Ewing has pointed out, the ordinary laboratory consists of one big steam engine, one big testing machine and there you have finished. But it should of course be remembered that in such cases the students who go to the Professor of Physics undoubtedly come across a great many of the more elementary mechanical experiments that it is desirable they should know. At the same time there is probably no institution in Great Britain, whose laboratory is at all so complete as that at Cambridge. There a man gets all his mechanical ideas firmly fixed. He experiments with the steam engine, with the testing machine, and with hydraulic apparatus, so you can easily imagine that the experiments which Professor Ewing described are only a very small proportion of the experiments that the students under him do.

There is one point with which I was particularly pleased, Professor Ewing mentioned, namely, the danger of the mechanical laboratory being overdone. In my opinion it is a danger and it is a danger which will increase in the next few years. You do not want a man who is becoming an engineer to depend entirely upon experiments and apparatus; you want him to be able to reason out, without any material aid in the shape of physical apparatus, what will happen if certain data are given to him; and I am afraid in a great many cases the extension of the mechanical laboratory can become too great. I do not refer, of course, to the higher colleges, but there are a great many institutions in which the teaching staff is necessarily limited, and in those institutions I think the student will look upon the apparatus as a sort of thing that is to be experimented with and there let the matter rest; in other words he will not trouble to reason the thing out on paper, which is essentially what engineers have to do.

I do not think I have any other remarks to make except to express the really very great pleasure which I have had in listening to Professor Ewing. I take it that there will be a great run upon mechanical laboratories and that each of us will immediately turn the spare room into one, where he may experiment for himself—at least that to a first approximation, is what I should like to do at Greenwich.

Professor A. G. Greenhill, F.R.S.: Students who have the privilege of attending Professor Ewing's lectures at the university are much to be envied when we compare his method with that which was in vogue in my time at Cambridge. At that date experimental illustration was frowned upon as something tending to engender a sceptical mind, and a mind antagonistic to calm introspective reflection. In a collection of Essays on the Conflict of Studies by the late Dr. Todhunter it was gravely maintained that if a student doubted that a certain thing was a fact when he was so assured by his instructor (in most cases a clergyman of the Church of England) the student was not much more likely to be impressed by any experiments (laughter).

The question of dilution of gravity (the phrase is Dr. Oliver Lodge's expression) came up in conversation this afternoon when we were discussing the possibilities of a flying machine and of human flight, a subject that was brought before us in this room in a lecture by Dr. Bryan. What would be the effect of diluting gravity supposing we could reduce gravity to half its present amount? Would it be possible to fly any easier? Because at the same time the density of the air would be halved? It appears that if gravity was reduced from 32 to 16, we should still be as far off the possibilities of flight as ever.

Before the commencement of the lecture Professor Ewing invited me to air some of my own heresies. I must confess that it gave me secret pleasure to hear him begin by describing what was the effect of the addition and the manipulation of certain "masses" in connection with his pendulum and gradually by some process of transmutation these "masses" became "weights" as the lecture went on. What was the essential difference then between the quantity which began by being a "mass" and ended by being a "weight"? I saw the converse process taking place very rapidly a short time ago during the preparation of the Naval Text Book of gunnery. A Captain of the Royal Navy was told off to prepare this book and when it was completed he had to submit the proofs to the Professor of Mathematics at Greenwich Naval College; and back came these proofs marked by his censor with every letter, "*w*" crossed out and replaced by the letter "*m*," and wherever the word weight occurred—weight of gun, shot, and so on, that also was crossed out and the word "mass" written instead, and the Naval Text Book of Gunnery so appears at the present day. I said to the Naval Captain, "Why did you do this? we are not going to have anything of the kind in our Text Book"; and the Captain said, "I do not like it myself; supposing I ask the Boatswain what is the mass of the anchor? he will think I am starting a theological discussion" (laughter).

There was a third reason that I was waiting to hear from Professor Ewing for the failure of Mr. Squeers' system of education; I was expecting him to say the third reason was the incompetence of his demonstrator, Nicholas Nickleby; but I suppose Professor Ewing arrested himself in time, seeing the presence in this room of his late demonstrator, Professor Dunkerley (laughter).

THE CHAIRMAN: If no other gentleman wishes to say anything I will make a few remarks.

Professor Ewing in his delightful lecture has given us merely a glimpse of his great versalility; he is quite as well known on account of his original work in physics as from the fact he is one of our foremost Engineers. The theory of magnetic hysteresis and much of the nomenclature and many of the ideas of the modern theory of magnetism are due to him. It has been remarked that the Professor has designed all the pieces of apparatus, shown and described to us this evening, which Cambridge experience has proved to be admirably adapted to the purpose of impressing indelibly upon students' minds the fundamental truths of mechanical science. My own experience as a student and teacher has convinced me that similar methods of instruction are much wanted in other departments of practical mathematics. Solid geometry, hydrostatics and hydrodynamics are subjects which it is difficult to learn or teach without models and apparatus. In descriptive geometry good models are occasionally found, but they seldom teach beyond the elements up to the theory of shadow construction.

We may gather from the remarks of Professor Ewing and of the speakers who followed him that there is a consensus of opinions that theory and practise should proceed hand in hand.

I do not believe we are in danger of seeing experimental methods over done. The student cannot appreciate the experiment without a knowledge of its theory which is thereby given a reality it could not otherwise possess. If he be an honest man the experiment will drive him to the book and the book to the experiment until the principles are fixed in his mind.

To take an illustration which has been supplied by the lecturer and to apply it to the present occasion I would remind you that he introduced to our notice an instrument called the absorption dynamometer. The object of the apparatus is to measure the power of a certain machine and if for a moment I may apply the term 'machine,' in no disrespectful sense, to our brilliant expositor—not as an idle machine but as one full of brains and instinct with life and energy—I think I may look upon ourselves as the absorption dynamometer and may say that our indication is that the machine is of unusual power and that Professor Ewing has vastly entertained and informed us (loud applause).

REPLY.

Professor Ewing: I am extremely grateful to you for your reception and for the kind way in which various speakers have referred to the lecture, I cannot but feel the subject is one of no great interest to a general audience.

Professor Dunkerley is quite right in saying that the absence of a laboratory saves the teaching staff. When I was a student of engineering my professor, a most excellent teacher, came to the university at nine o'clock, and at ten he went away again, and had the rest of the day to himself. The modern professor of engineering finds the whole day too short to spend in his laboratory.

I agree that it would be a very bad thing indeed if the engineering student were ever brought into such a condition by the use of experiment that he had lost the faculty of reasoning out things with the help of his brains and his drawing pencil. I do not think that experiment is likely to have that effect, because in reasoning out things what one is constantly doing is to revert back consciously or unconsciously to the things one has experienced, and the larger the volume of experience that you build up and store in your memory the better for the reasoning.

Professor Greenhill challenged me on the use of the words "mass" and "weight," I admit that in the exigencies of a lecture, when one is struggling to express one's idea by any word at all, the wrong word very probably slipped out. But I would point to the ballistic pendulum (Fig. 4), as an illustration of what I conceive should be the difference of usage between the words "mass" and "weight." When I spoke of determining the moment of inertia of this beam, I said that you could do it by observing the period of oscillation as it stands at present and then put into the pots two equal "masses." It is the mass of these pieces of matter that effects the moment inertia, their weight has nothing to do with it.

They might have no weight at all; so long as they retain the other properties which a mass possesses they will still act in causing any increase in the moment of inertia. Again, when I said that one way of finding the moment of inertia was to put a small "weight" into one of the pots, I was referring to the characteristic of the piece of matter which is then involved. If you put a small piece of metal into one of the pots you cause a statical deflection in consequence of the *weight* of that piece of metal, and submit that the word "weight" is appropriate then, whereas the word "mass" is undoubtedly the more appropriate word to use in the former case (applause).

Mr. Squeers certainly quarrelled with his demonstrator, but it was not due to any incompetence on the part of Nickleby. I have never known what it was to quarrel with a demonstrator; it would be an extremely impolitic thing to do and so long as one had a demonstrator like Professor Dunkerley it would be quite impossible.

I would like before sitting down to thank Major Abdy for his kindness in struggling with a very fractious lantern during these experiments. It has given him a great deal of trouble and has possibly caused a certain amount of annoyance to the audience as well, but we are all grateful to him for the trouble he has taken to make it work right at last.

The proceedings concluded with a vote of thanks tendered by the Chairman in the name of all present and carried with applause.

AUTOMATIC SIGHTING.

BY

COLONEL H. S. S. WATKIN, C.B., R.A.
Chief Inspector of Position Finding.

THE question of Automatic Sighting is now so much to the fore, and so many statements have been made as to their capabilities, that I think it might be of interest to look into the question both from a theoretical and practical point of view.

An automatic sight is one which finds the range and at the same time sets the gun to the elevation due to that range, by the mere act of laying the sights on the water line of the object. It is a *sine quâ non*

(1). That the gun must be at a certain known height above the water level; the greater the height the greater the accuracy.

(2). That the platform or emplacement must be truly level all round, and must continue so during firing, and this to a far greater accuracy than we have hitherto been accustomed to in our coast guns.

The theory of the apparatus will be seen from the following:—

Let *F B* represent a gun, placed at a height *B D* above the sea-level *D C*, and at such an angle of elevation that a shot fired from it will hit the water at the point *C*. Draw *E B* parallel to *D C*. It is clear that under these conditions, if the tangent scale *A F* is raised to a height *A F*, representing the elevation due to the range *B C*, the object *C* will be in line with the fore and hind sight.

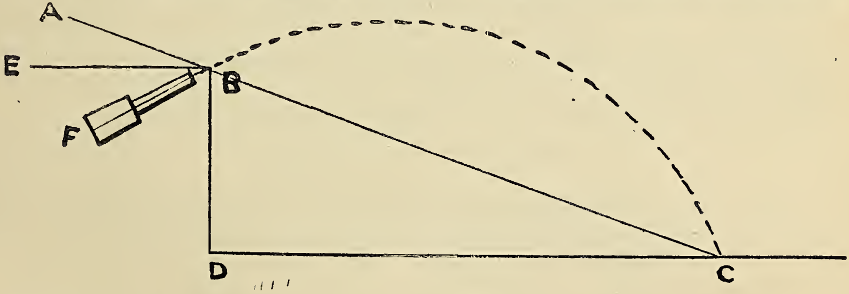


Fig. 1.

Then $A\,B\,F$ = *Tangent* angle of elevation.
$E\,B\,F$ = Quadrant angle of elevation.
$B\,C\,D$ = Angle of depression of object due to the height of the battery and the range, conveniently called the range-finding angle.

$$E\,B\,F = A\,B\,F - A\,B\,E.$$

But $A\,B\,E = B\,C\,D$ because $E\,B$ was drawn parallel to $D\,C$.

$$\therefore\ E\,B\,F = A\,B\,F - B\,C\,D.$$

The angle $B\,C\,D$ for ordinary heights can always be calculated from the formula.

$$\text{Depression angle in minutes} = \frac{\text{Height in feet} \times 1146.}{\text{Range in yards.}}$$

The condition to be fulfilled then for automatic sighting, are that when the gun $F\,B$ is elevated to any given angle to the horizon (quadrant angle), the tangent scale $F\,A$ must at the same time be automatically raised to the height, representing the distance the shot will be thrown due to that quadrant angle, or *vice versâ* if mechanism to fulfill the above condition is fitted to a gun, then whenever the eye looking over the sights sees the water line of the object, the gun will of necessity be at the right quadrant angle to hit that object.

It may not be generally known that having a gun fitted with a quadrant elevation scale, a modified form of automatic firing may be carried out. Thus, suppose we wish to fire at a target at a distance of 2200 yards which is slowly coming in. We could place the gun at the quadrant elevation due to 2,100 yards, raise the tangent scale also to 2,100 yards, and fire the moment the sights are on the water line of the target. It is evident that by so doing we have fulfilled the conditions given in Fig. 1, and that when the object is seen over the sights the target is at 2,100 yards.

The condition of accuracy can be obtained from the equation.

$$E\,B\,F = A\,B\,F - B\,C\,D, \qquad \text{and are}$$

(a). That the range-finding angle $B\,C\,D$ must be obtained with accuracy, in order to obtain the range for setting the tangent scale $A\,B\,F$.

(b). That any variation in the level of the platform will seriously affect the accuracy, in as much as it alters the quadrant angle $E\,B\,F$, and the angle of inclination of the sights.

With regard to *(a)* it is clear that the greater the height the less any inaccuracy in obtaining the depression angle will affect the range, and a short range will be far more accurately obtained than a long one. Take for example a height of 50 feet and 200 feet and ranges of 1,000 yards and 5,000 yards.

At 50 feet the depression angle for 1,000 yards is 57· ·3. minutes.
„ „ „ 1,025 „ 55· 9. „
„ „ „ 5,000 „ 11·46. „
„ „ „ 5,025 „ 11·40. „

That is to say to observe to an accuracy of 25 yards an angle of 1·4 minutes must be taken at 1,000 yards, but at 5,000 yards an angle observation of 0·16 minutes is required.

At 200 feet the depression angle for 1,000 yards is 3° 49. minutes.
„ „ „ 1,025 „ 3° 43 „
„ „ „ 5,000 „ 0°. 45·84 „
„ „ „ 5,025 „ 0°. 45·61 „

That is a difference of 6 minutes, only alters the range 25 yards at 1,000 yards, but at 5,000 yards an error of 0·23 minutes, will cause a same alteration of range.

These examples show what small angles have to be observed when the height of the battery is small, and that far more accuracy is required at long ranges than short ones. A good rough rule for obtaining the errors at various ranges, is to multiply the error at 1,000 yards by the square of the range. Thus, supposing the error *due to laying* be 20 yards at 1,000 yards, the error from the same cause at 2,000 yards would be 20 × 4 = 80 yards, at 3,000 yards it would be 20 × 9 = 180 yards and so on. The error due to height for any *given* range is very nearly inversely proportional to the height. Thus, for example, if an error of 20 yards is obtained at 150 feet height, the error from the same cause would be three times twenty at a height of 50 feet.

The errors we have been discussing are those due to actual laying, the important question then is with what accuracy can the human eye observe an angle. I have had considerable experience in this matter, and I feel convinced that the limit for *deliberate* laying is one minute, and a greater angle if the eyesight is not good, or properly trained. But where as in automatic sighting the observer has to follow a rapidly moving object, this limit must be at least doubled.

Granting this, it is easy to lay down the error that will be obtained with an automatic sight, from this cause, at any given range and height. The following is a table assuming the error to be two minutes:—

	Range.	Yards.			
Height. Feet.	1000	2000	3000	4000	5000
50	36	149	351	651	1058
100	18	72	166	305	478
150	12	47	109	196	308

The above are the errors worked out mathematically. For those who may be sceptical on these points, the following gives the actual errors of laying an automatic sight in 1879 when tried by a committee of experts. The sights were laid on a steamer moving out of the harbour, height of battery 150 feet.

Range.	Error.	Range.	Error.
1310	40	2580	210
2240	90	3140	500
		3900	890

So far then as regards the error due to the unaided eye, of course this will be reduced if telescopic power is applied. In certain weathers, in fog, and with powder smoke hanging about, a telescope cannot always be used with advantage.

We now come to the serious errors arising from want of level of the emplacement platform, etc. It must be in the experience of all officers who have worked with Coast Artillery how much the racers are out of truth, and if level to-day soon go out of truth with firing. So that the application of automatic sighting to the older form of guns and platforms is out of the question except for very short ranges. Even with the newer types the accuracy must be very considerable. Suppose, for purposes of calculation, we take the error of platform at four minutes, the following table gives the error for a 6″ Q.F. gun mounted at a height of 50 feet.

Range.		Error.
1000 yds.	+	12 yds.
2000 „	or	270 „
3000 „	—	750 „
4000 „		1550 „

(+ when platform is depressed).
(— „ „ „ elevated).

The method of arriving at these figures is as follows. Imagine the gun fitted with automatic sights to be placed on a platform capable of being tilted. When the platform was level, and the sights laid say at 2000 yards, the gun would be at a quadrant elevation of 1°. 28′, that is 1°. 57′ (tangent elevation for 2000 yards) minus 0° — 28·6′ (the range-finding angle).

Now if the platform is tilted 4′ down to the front it is evident that the gun will be at 4′ less quadrant of elevation, and thus throw the shot 57 yards short of the 2000 yards. At the same time the line of sight will also have been tilted 4′ down, and will cut the water at 1757 yards instead of 2000 yards. So that when the gun-layer brings his sights up to the target at 2000 yards, he will be virtually elevating the gun to 2270 yards (see above table). We see then that a very slight variation in the level of the platform, causes a large error in the quadrant elevation, owing to the automatic mechanism.

I think I have given figures enough to show that except, under special conditions, automatic sighting will not and cannot do away with the ordinary way of finding the range and laying the gun. Officers who have worked with the D.R.F. and P.F. know how exactly the instrument must be levelled in order to obtain co ect ranges, and this with levels that easily show difference of rr of a minute. How then is it possible to make a big gun on its comparatively rough mounting into a range-finding instrument. Of course, if you can get a site with a height of 200 or more feet, and are satisfied with moderate ranges, it can be done, but extraordinary care must be taken even then to have the racers, etc. very true.

It must be remembered that in firing with an automatic sight, the errors given under the headings *(a)* and *(b)* might be in the opposite direction and counteract one another, and good shooting would result; on the other hand they might be in the same direction when the results would be deplorable.

So far I have only given the theoretical conditions on which the automatic sight is based, the methods of carrying them into practice have been various. The one that perhaps will be most easily understood is the Italian sight tried in 1878–79. In this a rack *G* fixed to the carriage, revolves a pinion *H* in a fitting attached to the gun. Fixed to the pinion are three cams *E*, for use at low, mean and high tide. The tangent scale *A* sliding up and down freely in a socket *B* fixed to the gun has its lower end resting on one of these cams. The cams being cut to a proper curve it follows that when the gun is elevated or depressed the pinion *H* is revolved by the rack *G*, and the sight raised or lowered to the proper height to fulfil the conditions given in Fig. 1. This arrangement is rather inconvenient for the "layer," as he has to raise and lower his head for every movement of the gun.

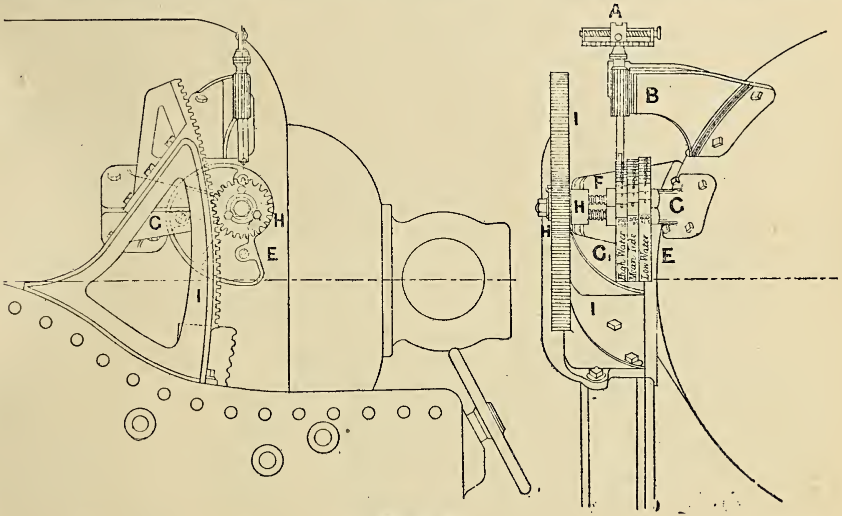


Fig. 2.

I had tried some experiments at Gibraltar in 1876 on the same lines but found the racers too much out of truth to admit of any accuracy.

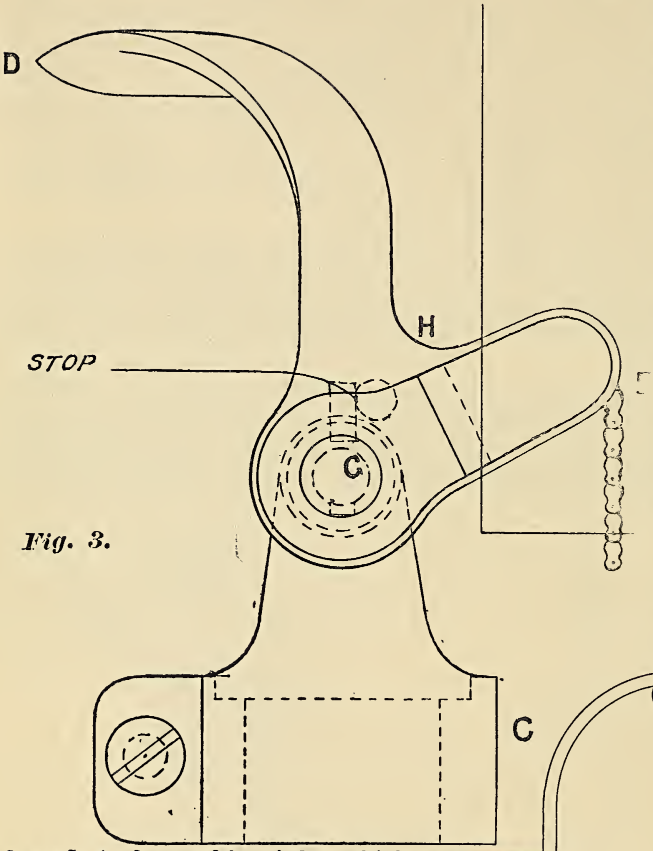


Fig. 3.

In designing my sight in 1894 for the War Office, it occurred to me that the disadvantage of the hind sight moving up and down would be got over if it could be arranged for the fore sight to move instead. It is evident that as far as giving an angle of elevation is concerned it matters not which sight is moved. Figs. 3 and 4 shows this sight which was successfully tried at a target travelling 18 to 20 knots. It is fixed to the ordinary fore sight of the gun, with which it did not in any way interfere, and thus allowed of ordinary laying being resorted to at any moment. A 6-pr. in which the sights recoiled with the guns was purposely selected by the committee, and I was specially debarred from using a telescope. Fig. 4 gives a front view of the fore sight of the gun with my automatic arrangement fitted to it. Fig. 3 a side view, both full size.

D is an acorn sight at the end of a lever *G D*, which is capable of revolving round an axis *G*. *G E* is a projecting piece, forming part of the lever *G D*. Around the end of *E* is passed a chain, one end of which is

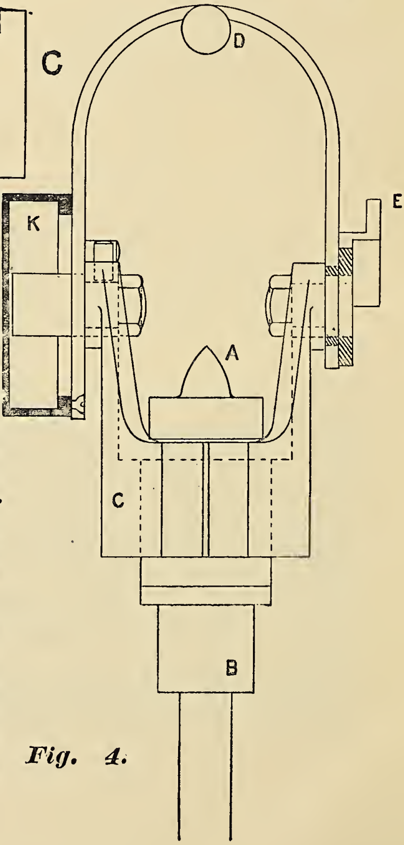


Fig. 4.

fixed at H; the other end being attached to a fixed part of the mounting. A spiral spring K enclosed in a box presses the lever $G\ E$ upwards, and thus keeps the chain taut. It is evident from this arrangement that as the trunnions on which the gun revolves are behind the fore sight, if the gun is elevated the chain pulls down the lever $G\ E$, and with it the point of the sight D. This as far as sighting is concerned is the same as if the tangent scale was raised. The amount the point D is depressed for any given movement of the gun is governed by the position, length and shape of the end of the arm $G E$. This is arranged to suit the height of the gun above the sea-level, so that the condition given in Fig. 1 may be fulfilled. That is the act of laying the sight on any object on the sea-level, brings the gun to the right quadrant elevation to hit that object. To allow for rise and fall of tide, or variation of powder, the end of the chain attached to the fixed portion of the mounting is capable of being moved up and down by a milled headed wheel, on which was engraved yards over or under, and feet scale, of rise and fall of tide. The officer in charge could thus *without stopping or interfering with the layer* alter the shooting as he pleased to meet the variation of the day.

The problem of automatic sighting, applied to the carriage with no recoil to take into account, is, I think, a simpler matter, and more easily admits of the application of telescopic power. As to the best telescope, I have no hesitation in saying it should be one with very low magnifying power and large field. After a good deal of difficulty I have managed to obtain such a telescope.

In conclusion, I trust I have sufficiently explained automatic sighting to allow of the principle on which it is based being understood and at the same time pointed out the danger of supposing that they can take the place generally of the present methods of laying guns.

FUND.

MARCH, 1898.

	ture.	£	s.	d.
E		5	0	0
		8	3	3
By Sub	5000	18	15	0
„ Gov		36	10	0
„ Sale		9	2	6
		0	4	6
„		3	6	9
„ Reb				

	Royal Artillery Band. £	s.	d.	Mounted Band £	s.	d.	£	s.	d.
Cases	181	2	3	48	0	11			
	85	19	0	29	4	2			
, &c.	22	10	6	20	17	0			
	1012	17	2	340	0	0			
	9	16	9	7	13	9			
	9	2	6	—					
	20	0	0	9	0	0			
s	2	2	11	—					
	1	1	6	0	12	0			
and Stables	12	0	7	5	4	6			
	42	0	9	—					
	18	6	8	6	10	6			
	1417	0	7	467	2	10	1884	3	5
t March, 1898							315	14	6
TOTAL							£2280	19	11

T.

	ASSETS.	£	s.	d.
Subscri	98	24	9	8
Unpres	udall Carte's bill	0	17	8
	passed)	30	0	0
(Not incl	ks	318	2	6
£500				
	TOTAL	£373	9	10

Colonel R.A., *President.*

ecretary & Treasurer.

ROYAL ARTILLERY BAND FUND.

GENERAL CASH ACCOUNT FOR THE YEAR ENDED 31st MARCH, 1898.

Income.	£	s.	d.
Balance in hand on 31st March, 1897	271	10	7
By Subscriptions received	1863	12	0
" Government Grant for 1897–8	100	0	0
" Sale of old Instruments	9	14	0
" " Clothing	6	0	0
" Rebate of Income Tax for 1896-7.	30	3	4
Total	£2280	19	11

Expenditure.	Royal Artillery Band. £	s.	d.	Mounted Band £	s.	d.	£	s.	d.
To Postal Expenses							5	0	0
" Printing and Stationery							8	3	3
" Insurance to Michaelmas, 1898, on £5000							18	15	0
" Allowance to Clerk							36	10	0
" " Pay Sergeant							9	2	6
" Cheque Books							0	4	6
" Miscellaneous							3	6	9
" Purchase of Instruments, Slings, and Cases	181	2	3	48	0	11			
" Purchase of Music, Stands, and Cases	85	19	0	29	4	2			
" Repair of Instruments, Stands, Cases, &c.	22	10	6	20	17	0			
" Pay of Master and Musicians	1012	17	2	340	0	0			
" Clothing	9	16	9	7	13	9			
" Lodging Allowance	9	2	6	—					
" Arranging and Copying Music	20	0	0	9	0	0			
" Postage and Carriage of Instruments	2	2	11	—					
" Stationery and Printing	1	1	6	0	12	0			
" Fuel and Articles for Practice Room and Stables	12	0	7	5	4	6			
" Violin and other Strings	42	0	9	—					
" Reeds and Drum-heads	18	6	8	6	10	6			
Totals	1417	0	7	467	2	10	1884	3	5
Balance in hand on 31st March, 1898							315	14	6
Total							£2280	19	11

GENERAL STATEMENT.

Liabilities.	£	s.	d.
Subscriptions for 1898–9 received in advance	7	5	10
Unpresented Cheque, Shaw and Sons	2	8	0
Balance credit, 31st March, 1898 (Not including Instruments, Music, &c., which are insured for £5000.)	363	16	0
Total	£373	9	10

Assets.	£	s.	d.
Subscriptions unpaid to 31st March, 1898	24	9	8
Due from Mounted Band, discount on Rudall Carte's bill	0	17	8
Rebate of Income tax 1896–7, (not yet passed)	30	0	0
Balance cash as per Cash and Pass Books	318	2	6
Total	£373	9	10

F. O. BARRINGTON-FOOTE, Lieut.-Colonel R.A., *President.*
R. J. MACDONALD, Captain R.A., *Secretary & Treasurer.*

JUL 11 1898
PATENT OFFICE

ABSTRACT OF THE PROCEEDINGS

OF THE

SIXTY-FIRST ANNUAL GENERAL MEETING

OF THE

ROYAL ARTILLERY INSTITUTION.

The Meeting was held in the Lecture Theatre, Royal United Service Institution, Whitehall, on Friday, 3rd June, 1898.

Lieut.-General Sir E. Markham, K.C.B., I.G.O., took the chair at 3 p.m. and asked the Secretary to read the Report as follows :—

Lectures.

During the past season the following ten lectures were given at the Institution :—

"A System of Comparing Geographical Distances." By Captain F. J. S. Cleeve, R.A., 14th October, 1897.

"Invasion,"—A war game. By Lieutenant H. Chamberlain, R.N., 28th October, 1897.

"Experiences of the Turco-Greek War." By Major C. E. Callwell, R.A., 11th Nov., 1897.

Artillery: psychologically and ethically considered. By Captain W. V. Herbert, Turkish Army. 25th Nov., 1897.

"Wireless Telegraphy and its Military Possibilities." By Captain W. P. Brett, R.E., 9th December, 1897.

"Recruiting." By H. O. Arnold-Forster, Esq., M.P., 16th Dec., 1897.

"Röntgen Rays up-to-date." By W. Webster, Esq., F.C.S., 27th January, 1898.

"The Teaching of Mechanics by Experiment." By J. A. Ewing, Esq., F.R.S., Professor of mechanism and applied mechanics in the University of Cambridge, 10th Feb., 1898.

"The Rusting of Iron and Steel." By Professor Wyndham Dunstan, M.A., F.R.S., Sec. C.S., Director of the Scientific Department of the Imperial Institute, 24th Feb., 1898.

"The Mechanism of Bicycles." By Major S. B. Von Donop, R.A. Professor of Artillery at the Royal Military Academy, 10th March, 1898.

Mr. C. V. Boys, F.R.S., a special honorary member R.A.I. was kind enough to take the chair at Major Von Donop's lecture and gave the audience the benefit of his great knowledge and experience in his summing up of the lecture and its discussion.

Lectures at out-stations. The members of the Institution stationed at Dover have again availed themselves of the privilege of lectures arranged for them by the R.A.I. Mr. Arnold-Forster kindly gave them another lecture on "Recruiting," and Colonel A. E. Turner, C.B., A.-A.-G., R.A., one on "The Investment of Metz, McMahon's march from Chalons to Sedan—Battle of Sedan." On each occasion the room was filled to its utmost capacity.

Duncan's History. The Committee bought from Mr. John Murray the entire remain of the 3rd edition of Duncan's History of the Regiment and sold them to members very quickly.

Offers of gifts. The Committee have received from a retired officer an offer to place in their charge his father's swords of honour, medals and decorations, and further, a notification that if the Committee will take care of them he proposes to leave them by will all his own medals and tokens of rewards. The Committee have in reply said that they will take the greatest care of any articles sent to them in this way and display them in a way due to the distinguished recipients.

They take this opportunity of again making known the fact that the Institution is always available for the reception and careful display of any object of Regimental interest from whatever source it may be received.

Instruments and machines. The Committee decided to part with some statical electrical machines that had for many years stood unused and were most fortunate in receiving help in the matter from Captain M. C. Maunsell, R.A., Instructor in electricity at the R.M. Academy. This officer arranged in exchange for these machines the supply and installation of a new Voltmeter and Ammeter for use with the dynamo current; the thanks of the meeting are due to him for his most valuable assistance.

The dynamo and electric lantern have been used at every lecture where slides or electrical experiments were shown and the economy anticipated by the Committee when buying the engine and fittings has been fully realized.

Hadcock's Lists. As announced at the meeting last year the Committee published and issued free of charge to all members an extension (to unit velocity) by Mr. A. C. Hadcock of the I and A columns of the Abridged Ballistic Tables originally compiled by him in collaboration with Professor A. G. Greenhill, F.R.S.

They ask you to acknowledge by a vote of thanks Mr. Hadcock's generosity in placing such valuable tables at the disposal of members of the Institution. The labour involved in their preparation must have been considerable, and there is but small prospect of Mr. Hadcock reaping pecuniary benefit from the extra copies printed for him.

Printing office. In the printing office two hand presses have been exchanged for a new Mitre platen machine; this is worked by the same engine and shaft as the large press and on it all small work such as plates and notices can be printed off at the same time as "Proceedings" or "Lists" are being printed on the latter.

Several minor changes and improvements have been made in the printing office and the Committee hope that there is improvement in the work turned out.

Regimental Lists.

The number of officers in the Regiment and the variety of appointments they hold have become so many that great difficulty is experienced in printing the regimental lists; the recent enlargement of them has made the work a little easier, but it will take most careful attention for some months before a satisfactory result is obtained; the Committee take this opportunity to thank those members who so kindly help by a monthly inspection and report to the Secretary of errors found in the lists.

History of the Dress of the Royal Artillery.

The subscription list for the 'History of the Dress of the Royal Artillery' has been filled; a few numbers of the edition which were not subscribed for have been taken up by the Committee and will be available for issue at the original rate to young officers joining from the R.M.A. Terms for reproduction have been made with the famous firm of Goupil & C^{ie}, who will furnish first proof copies for guarantors, ordinary copies for subscribers and a certain number of loose copies of the colour plates which will be on sale at the same price (£1 1s.) as the book to non-subscribers but available for purchase by guarantors and subscribers at a largely reduced price. The books will be sent out free of charge to every guarantor and subscriber as soon as possible.

Kane's List

The work of preparing the new edition of Kane's List is practically complete and printing will proceed forthwith; when ready for issue the Committee will announce the price at which each copy will be sold; this will be small in the hope that nearly every officer in the Regiment will buy one and because, as mentioned at the last Annual General Meeting, it is felt that Kane's List is an object on which to spend the funds of the Institution.

Deaths.

The number of deaths in the past year has been very large and includes the names of the following officers:—

Generals W. H. Askwith, Col.-Commdt., Sir R. Cadell, K.C.B. Col.-Commdt., W. D. Aitken, Col.-Commdt., and Sir H. L. Gardiner K.C.V.O., C.B., Col.-Commdt., Lieut.-General G. Leslie, Col.-Commdt., Major-Generals Sir G. Bourchier, K.C.B., R. H. Crofton, C. H. Smith, C.B., Hon. G. T. Devereux, G. J. Smart, P. Bedingfeld, D. G. Anderson, G. Maister, H. Hammond, and A. G. Yeatman-Biggs, C.B., Colonels H. C. S. Dyer, S. C. Kyle, A. E. Garnault, L. W. Taylor, and H. C. Lyle, Lt.-Cols. J. F. Harman, R. C. E. North, and R. A. C. King, Majors E. Cassan, R. D. Loudon, and E. A. Smith, Captains J. R. C. Sclater, A. M. C. Dale, J. F. Browne, (killed in action), H. J. H. Winwood, M. H. B. Raby, T. M. Dickinson, C. E. Rolt, F. R. Mc C. de Butts (killed in action), C. A. Molony (killed in action), and W. Shipman, Lieutenants L. L. Harper, A. T. Crawford (killed in action), H. D. Hammond (from wounds received in action), H. A. Cruickshank (killed in action); S. V. Schofield; and 2nd Lieutenant F. T. Ord.

The greater number of these were well known to most, but by the deaths of Generals Askwith and Sir L. Gardiner the Regiment in general and Institution in particular have sustained a heavy loss. The Committee were fortunate in securing the services of one who was able to do justice to the memory of General W. H. Askwith in the "Proceedings" for February of this year, but in addition to that it will interest the meeting to learn that the work of extracting officers' records of service abroad, instituted by General Askwith and carried out under his directions for the new edition of Kane's List, was completed a fortnight before his death.

The number of lives of promising young officers cut short in the recent operations in India is painfully large.

By the death of Mr. Henry Whitely, which occurred on the 30th March, the members of the Institution lost a faithful friend who had served them for more than 44 years. When the present R.A.I. building was opened in 1858 he installed in it the natural history collections and has arranged and cared for them ever since; the good state in which the many valuable specimens are is entirely due to Mr. Whitely and it should not be forgotten that some of the best of them are presents from him.

Duncan Gold Medal. The subject of the Essay for the "Duncan" Gold Medal, 1898, was "The advantages and disadvantages of Q.F. guns for Artillery in the field."

Essays. Major-General G. H. Marshall, Lt.-Colonel H. T. S. Yates, R.A. and Major H. C. Sclater, R.A., kindly consented to act as Judges. Last year's large number of 25 have now been exceeded by 2 and the Judges have had a most heavy task; they recommend that:—

No Gold Medal be awarded.

Two Silver Medals be awarded as follows:—For the essay bearing the motto "*Ne pas avancer c'est reculer*" a silver medal, for the essay bearing the motto "*Circumspice*" a silver medal. They commend and recommend the publication of the essays bearing the following mottos, viz.:—"*Sharp's the word and quick's the motion,*" "*A friend in need is a friend indeed,*" and "*Nec temere nec timide.*"

The Secretary opened the sealed envelopes and announced that Major N. B. Inglefield, R.A. and Major F. B. Elmslie, R.A. are the winners of the Silver Medals and that Captain H. W. Barlow, R.A., Captain R. A. K. Montgomery, R.A. and Lieutenant A. S. Buckle, R.A., are commended.

Honoraria of Five Pounds were voted to the writers of each of the commended essays.

Rewards for papers. Colonel E. Blaksley, Lt.-Colonel F. A. Yorke, R.A. and Captain L. R. Kenyon, R.A., kindly consented to act as Judges and award amounts as follows:—

Captain A. E. A. Butcher	"Fighting Books"		£5
Major E. S. May	"The choice, occupation and change of positions by Field Artillery"	£3	£5
	"Study of Military History"	£2	

Capt. W. P. Brett, R.E.	"Wireless Telegraphy" ...	£4
Lt.-Col. Sir G. S. Clarke R.E.... ...	"Mountings for Coast Artillery"	£3
Charles Dalton, Esq.	"Artillery under the Stuart Kings."	£3
Capt. J. C. Wray	"Militia Field Artillery ...	£3
Capt. J. E. W. Headlam	"German Method of bringing Guns into Action" ...	£3
Capt. O. C. Williamson	"Encampments in Hill Warfare."	£3
Capt. A. G. Shortt	"Drift of Service Projectiles"	£3
Lt.-Colonel J. C. Dalton	"Salmon Fishing in Canada"	£2
Brigadier-General C. H. Spragge... ...	"Field Artillery"	£2
Lieut. A. W. Pack-Beresford	"The Artillery of Japan" ...	£2
Capt. C. B. Levita	"A Visit to South Africa ...	£2
Major A. C. Bailward	"With the Turks"	£2
Capt. E. E. Norris	"Laying with a Clinometer"	£2
Capt. L. C. Gordon	"The Maizar Affair." ...	£2
Capt. F. R. Maunsell	"Notes on Training Scouts."	£2
Capt. F. J. S. Cleeve	"A System of Comparing Geographical Distances." ...	£2

Two subjects were then chosen for submission to the authorities, the one selected will be announced as that for the Duncan Gold Medal Prize Essay, 1899.

Subjects for 'Duncan' Essay, 1899.

COMMITTEE.

Changes during the past year—

Major H. V. Cowan, vice Major E. A. Burrows.
Lt.-Col. P. C. E. Newbigging, vice Colonel E. Blaksley.
Captain A. H. S. Goff, „ Captain E. E. Norris.

It is now constituted as follows :—

PATRON AND PRESIDENT :

Field Marshal H.R.H. the Duke of Cambridge, K.G.

VICE-PRESIDENTS :

The Inspector-General of Ordnance.
The Deputy-Adjutant-General, R.A.
The General Officer Commanding Woolwich District.

MEMBERS :

The Assistant-Adjutant-General, R.A.
The Director, Artillery College.
The Assistant-Adjutant-General, Woolwich.
The Secretary, Ordnance Committee.

Col. R. D. E. Lockhart.
Lt.-Col. E. M. Baker.
„ P. C. E. Newbigging.
„ J. W. T. Spencer.
„ F. A. Yorke.
Major G. N. H. Barlow.
„ G. E. Benson.
Major G. H. Bittleston.
„ H. V. Cowan.
„ W. E. Fairholme.
„ H. B. Jeffreys.
„ H. C. Sclater.
Captain F. J. S. Cleeve.
„ A. H. S. Goff.
„ L. R. Kenyon.

Bankers:

Messrs. Cox & Co., and London and County Bank.

Solicitor:

E. W. Sampson, Esq., Woolwich.

TRUSTEES:

General Sir C. Dickson, V.C., G.C.B.
„ Sir H. A. Smyth, K.C.M.G.
Lieut.-General R. P. Radcliffe.

Secretary:—Major A. J. Abdy.

Votes of thanks to Captain M. C. Maunsell, R.A., A. C. Hadcock, Esq., the Judges of the Essays, the Judges of rewards for papers were carried unanimously; the Report as above with appendices was adopted and the accounts as presented in Appendix A. were passed.

CHAIRMAN: I believe, as far as the actual business of the meeting goes, it is now brought to a conclusion, but before you separate there is one thing it is my duty to put before the meeting, that is with regard to our Secretary. Major Abdy completed his term of service on the 19th March last; he is now a locum tenens until his successor arrives. I am quite sure I am only speaking the sense of the meeting when I say that we should upon this occasion acknowledge his services during the period of his tenure of office as Secretary of the Royal Artillery Institution (hear, hear). He has at all times shown the greatest courtesy to all the members, and I may say to every-one else who has been in contact with him in connection with this Institution. He has exhibited great energy and has devoted himself in every way to its interests. Therefore, I now propose a motion that we do pass a vote of thanks to Major Abdy for the care he has given and the interest he has shown in the Institution during the time he has been in office.

MAJOR-GENERAL F. T. LLOYD C.B.: I beg to second the vote of thanks.

Carried unanimously.

MAJOR ABDY briefly thanked the meeting and the meeting dissolved.

8	Amount to Credit of Members on current Accounts……,…….	33 11 3	
172			220 4 7
17	" Members' Subscriptions paid in advance………………….		19 2 0
190			239 6 7
4368	" Balance being surplus of Assets or "Accumulated Fund" at 31st March, 1898…………………………….		4363 9 3
	viz.:—		
	Surplus at 31st March, 1898……………………………………	4368 13 7	
	Less—Excess of Expenditure over Income in year ending 31 March, 1898, as per Expenditure and Income account.	5 4 4	
		4363 9 3	
4559			£4602 15 10

N.B.—This Surplus is in addition to the value of the contents of the Museum and Library, Instruments, Furniture, Fixtures, &c., belonging to the Institution, which the Committee have estimated at £12,000, and which are insured in the Sun Fire Office for that sum.

	viz.:	Amount owing by Members for subscriptions included in Income………………………………	38 13 6	
53				
176				176 16 5
46	" Stocks on hand, viz.:	Printing paper………………………………	88 2 2	
45		Books for Sale ……………………………	44 2 3	
91				132 4 5
3692	" Investments, viz.:	£3739 1s. 9d. Consols at cost…….		3692 8 2
4559				£4602 15 10

AUDITORS' CERTIFICATE.

We have compared the foregoing Accounts with the monthly Cash Accounts audited by the Committee and with the books of the Institution and certify the same to be correct. We have also examined portions of the Cash and Ledger Accounts with the vouchers and have found them in order and have verified the Cash Balances and the Investment in Consols.

7th May, 1898.

AGAR, BATES, & Co.
Chartered Accountants,

APPENDIX A.

GENERAL ABSTRACT
OF THE
ACCOUNTS OF THE ROYAL ARTILLERY INSTITUTION,
From 1st April, 1897, to 31st March, 1898.

EXPENDITURE AND INCOME.

1896-7 £	EXPENDITURE.	£ s. d.	£ s. d.
114	Printing etc. — Wages—Compositors, &c.	113 15 0	
83	Printing etc. — Printing Accounts	240 7 5	
143	Printing etc. — Folding, Stitching, &c.	161 17 11	
262	Printing etc. — Printing Materials	363 5 9	
196	Printing etc. — Wood Engraving and Lithography	137 6 5	
798			1016 12 6
	Classes		29 0 3
79	Lectures		61 10 1
447	Library and Books for Sale		348 3 5
52	Museum		53 11 4
11	Observatory		11 17 8
23	Carpentry and Repairs — Wages	23 9 6	
80	Carpentry and Repairs — Materials	82 1 5	
			105 10 11
1	Stationery		14 10 8
97	Postage and Parcels		148 10 5
152	Clerks and Orderlies — Wages	141 1 7	
17	Clerks and Orderlies — Clothing	13 17 0	
169			155 1 7
4	Auditors		4 4 0
5	Subscriptions to Societies		3 3 0
30	Fire Insurance		31 18 6
28	Washing and Cleaning		27 4 3
9	Subscriptions refunded		9 7 0
4	Collecting Woolwich Bills, and Christmas Boxes		4 7 6
96	Medals, Honoraria and Rewards		101 10 1
7	Arrears of Subscriptions written off		14 13 6
	Mrs. Bryant		26 0 0
15	Grant to Sergt.-Major Bryant		0 0 0
2	Grant to War Game Committee		0 0 0
5	Fund for Phillips Memorial		0 0 0
1916			
164	Surplus of Income over Expenditure in 1896-7.		
2080			£2166 16 8

1896-7 £	INCOME.	£ s. d.	£ s. d.
119	Amount charged to Members for — Printing	149 14 3	
262	Amount charged to Members for — Books, &c.	246 17 1	
29	Amount charged to Members for — Postage and Parcels	32 6 9	
0	Amount charged to Members for — Carpentry	0 2 6	
410			431 4 1
71	Entrance Fees and Subscriptions for 1897-98. — Entrance Fees—Received	101 0 0	
1460	Entrance Fees and Subscriptions for 1897-98. — Subscriptions—Received	[illegible] 5 0	
33	Entrance Fees and Subscriptions for 1897-98. — Subscriptions—Outstanding	[illegible] 15 6	
1564			[illegible]
99	Dividends for a year on £3739 1s 9d. Consols less Income Tax		[illegible]
1	Interest on Bank Deposit		[illegible]
5	Phillips Memorial		[illegible]
			[illegible]
	Balance being excess of Expenditure over Income, in the year ending 31st March, 1898		[illegible]
2080			[illegible]

APPENDIX B.

BALANCE SHEET.—31st March, 1898.

1897 £	Dr. LIABILITIES, &c.	£ s. d.	£ s. d.
161	To [illegible] Creditors, viz.: Accounts for goods, Printing, &c., owing by the Institution and included in Expenditure for the year 1897-8	186 13 4	
	Amount to Credit of Members on current Accounts	33 11 3	
17			220 4 7
[illegible]	" Members' Subscriptions paid in advance		19 2 0
190			239 6 7
4368	" Balance being surplus of Assets or "Accumulated Fund" at 31st March, 1898		4363 9 3
	viz.:—		
	Surplus at 31st March, 1898	4368 13 7	
	Less—Excess of Expenditure over Income in year ending 31 March, 1898, as per Expenditure and Income account.	5 4 4	
		4363 9 3	
4559			£4602 15 10

N.B.—This Surplus is in addition to the value of the contents of the Museum and Library, Instruments, Furniture, Fixtures, &c., belonging to the Institution, which the Committee have estimated at £12,000, and which are insured in the Sun Fire Office for that sum.

1897 £	ASSETS.	£ s. d.	£ s. d.
590	By Cash in hand and at Bankers, including £500 on Deposit Account at Interest		[illegible]
123	" Sundry Debtors, viz.: Amount owing by Members on current Accounts, included in Income	[illegible]	
53	Amount owing by Members for subscriptions included in Income	[illegible]	
176			[illegible]
46	" Stocks on hand, viz.: Printing paper	[illegible]	
45	Books for Sale	14 2 [illegible]	
91			[illegible]
3692	" Investments, viz.: £3739 1s. 9d. Consols at cost		[illegible]
4559			[illegible]

AUDITORS' CERTIFICATE.

We have compared the foregoing Accounts with the monthly Cash Accounts audited by the Committee and with the books of the Institution and [illegible]. We have also examined portions of the Cash and Ledger Accounts with the vouchers and have found them in order and have verified the Cash [illegible] Consols.

AGAR. [illegible]

7th May, 1898.

APPENDIX C.

Statement shewing Increase and Decrease of Members of the Institution during the year ending 31st March, 1897.

RANKS	1st April, 1897.	Increase.			Total Increase.	Decrease.				Total Decrease.	Balance.		31st March, 1898.
		Promotions.	Retirements.	New Members.		Promotions.	Retirements.	Withdrawals.	Deaths.		Decrease.	Increase.	
EFFECTIVE LIST.													
Generals and Field Officers	434	51	—	1	52	—	31	1	10	42	—	10	444
Captains	444	62	—	1	63	51	9	—	6	66	3	—	441
Lieuts. & 2nd Lieuts.	703	—	—	99	99	62	14	2	8	86	—	13	715
Veterinary Surgeons	1	—	—	—	—	—	—	—	—	—	—	—	1
Quarter-Masters ...	1	—	—	1	1	—	—	—	—	—	—	1	2
Riding Masters ...	1	—	—	1	1	—	—	—	—	—	—	1	2
RETIRED LIST.													
Generals and Field Officers	203	—	31	—	31	—	—	10	6	16	—	15	218
Captains	83	—	9	—	9	—	—	2	1	3	—	6	89
Lieuts. & 2nd Lieuts.	19	—	14	—	14	—	—	—		—	—	14	33
Paymasters ...	2	—	—	—	—	—	—	—	—	—	—	—	2
Riding Masters ...	1	—	—	—	—	—	—	—	—	—	—	—	1
Medical Officers ...	2	—	—	—	—	—	—	—	—	—	—	—	2
Chaplains	1	—	—	—	—	—	—	—	—	—	—	—	2
HONORARY MEMBERS.	34	—	—	9	9	—	—	6	1	7	—	2	36
Totals ...	1928	113	54	112	279	113	54	21	32	220	3	62	1987

As the information afforded by Appendices D. E. and F. in former years has been published each month in notes to "Proceedings" they are not now added. Appendices.

APPENDIX G.

List of Papers published in the "Proceedings" during the year.

The British army on the continent of Europe. By Thomas Miller Maguire, Esq., L.L.D.
Coast Defence. By Captain F. M. Lowe, R.A.
Röntgen Rays. By W. Webster, Esq.
The Science of Frontier Delimitation. By Lieut.-Colonel J. K. Trotter. R.A.
Direct and Indirect Fire. By Major J. L. Keir, R.H.A.
Encampments in Hill Warfare on the N.W. Frontier of India. By Captain O. C. Williamson, R.A.

The Total Solar Eclipse of January 1898, as visible in India. By Captain E. H. Hills, R.E.

Short Notes on the Montenegrin Army. By Lieut.-Colonel de C. Daniell, R.A.

Report on Militia Artillery Competitive Practice, Cork District, 1896. By Colonel H. Torkington, R.A.

A Visit to South Africa. By Lieutenant C. B. Levita, R.H.A.

Abstract of the Proceedings of the Sixtieth Annual General Meeting of the Royal Artillery Institution.

Coast Artillery Practice; how best to conduct it with regard to the requirements of actual warfare. By Captain H. S. Jeudwine, R.A.

Coast Artillery Practice; how best to conduct it with regard to the requirements of actual warfare. By Captain N. W. H. Du Boulay, R.A.

Coast Artillery Practice; how best to conduct it with regard to the requirements of actual warfare. By Lieutenant C. G. Vereker, R.A.

The choice, occupation and change of positions by Field Artillery. By Major E. S. May, R.H.A.

The German method of bringing guns into action. By Captain J. E. W. Headlam, R.A.

The study of Military History as a means of training for war. By Major E. S. May, R.H.A.

Accident to 12-inch B.L. gun on board the Russian battle-ship "Sisoi Veliki." By Captain H. Forbes Mackay, R.M.A.

Competitive practice in the Garrison Artillery and its effect on the training of officers and men. By Major C. N. Simpson, R.A.

Notes on training artillery scouts. By Captain F. R. Maunsell, R.A.

A Cruising visit to some German battle-fields. By Poultney Bigelow, Esq., Author of " The German Struggle for Liberty,

Consular experiences in Turkey. By Colonel E. Clayton, R.A.

The Drift of service projectiles. By Captain A.G. Shortt, R.A.

Rawal Pindi to Lucknow. By Major J. A. Coxhead, R.H.A.

With the Greeks. The artillery at Domokos. By Major C. E. Callwell, R.A.

The Nile cataracts. By Major-General Sir W. Butler, K.C.B.

An episode in the Siege of Sevastopol, By Colonel F. A. Whinyates, *late* R.H.A.

Mountings for Coast Artillery. By Lieut.-Col. Sir G. S. Clarke, R.E., G.C.M.G. F.R.S.

Laying with a Clinometer. By Captain E. E. Norris, R.A.

Fighting books. By Captain A. E. A. Butcher, R.A.

Notes on Artillery dictated by Napoleon at St. Helena to Baron Gourgaud. By F. E. B. L.

The Artillery of Japan. By Lieutenant A. W. Pack-Beresford, R.H.A.

Artillery under the Stuart Kings, 1424–1625. By Charles Dalton, Esq.

The Maizar Affair. By Captain L. C. Gordon, R.A.

The Services of Lieut.-Colonel Francis Downman, R.A. in France, North America, and the West Indies, between the years 1758 and 1784. By Colonel F. A. Whinyates, late R.H.A. (*continued*).

British Gunners at the siege and battle of Narva. By Charles Dalton, Esq.

A few plain remarks on the positions and work of the artillery in the field. By Brigadier-General C. H. Spragge, R.A.

Militia Field Artillery. By Captain J. C. Wray, R.A.

Methods of bringing guns into action. By Major-General T. B. Tyler, R.A.

A short summary of the cover question. By Major J. L. Keir, R.H.A.

Recruiting. By H. O. Arnold-Forster, Esq., M.P.

Salmon Fishing in Eastern Canada. By Lieut.-Colonel J. C. Dalton, R.A.

Memoir of General W. H. Askwith, Colonel-Commandant, R.A.

Wireless Telegraphy and its Military Possibilities. By Captain W. P. Brett, R.E.

A System of Comparing Geographical Distances. By Captain F. J. S. Cleeve, R.A.

Outposts for Coast Defence. By Major R. M. B. F. Kelly, R.A.

APPENDIX H.

Précis and Translations Published during the Year.

FRENCH	"Military Cyclism." By F.E.B.L.
GERMAN	"Archiv für die Artillerie und Ingenieur Offiziere." The development of the Austrian Mountain Artillery. By 2nd Lieutenant A. M. Seton, R.A.
RUSSIAN	"Russian Artillery Journal." Cavalry and the Artillery Duel. By Major E. A. Lambart, R.H.A.
SPANISH	"Memorial de Artilleria." An Improved Driving Band for B.L. Projectiles. By Major A. Samut, A.O.D.

APPENDIX I.

LIST
OF
FOREIGN MAGAZINES AND JOURNALS
TAKEN IN BY THE
R.A. INSTITUTION;
WITH THE NAME OF OFFICERS WHO HAVE UNDERTAKEN TO SUPPLY PRÉCIS AND REVIEW OF THEIR CONTENTS FROM TIME TO TIME.

COUNTRY.	NAME OF JOURNAL, &c.	TRANLATOR.
France	Spectateur Militaire	Capt. M. C. Maunsell.
	Journal des Sciences Militaires	Major J. F. Manifold.
	Revue d'Artillerie ...	Lt.-Col. F. E. B. Loraine, late R.A.
	Revue Militaire de l'Etranger	Lt.-Col. J.H.G. Browne, late R.A., and Major E. J. Granet.
Spain	Memorial de Artilleria.. ...	Lt.-Col. J. C. Dalton.
	Revista Técnica de Infanteria y Caballeria	—
Germany	Neue Militärische Blätter ...	Capt. A. B. Denne.
	Archiv für die Artillerie-und Ingenieur-Offiziere ...	2nd Lt. A. M. Seton.
	Militär-Wochenblatt	Major E. S. May.
	Jahrbücher für die Deutsche Armee und Marine ...	Capt. F. J. S. Cleeve.
	Allgemeine Militär und Sport Bibliographie	Capt. F. J. S. Cleeve
Austria	Organ der Militär-Wissenschaftlichen Vereine...	2nd Lt. J. T. Dreyer
	Militärische Zeitschrift...	Capt. St. J. L. H. du Plat-Taylor
	Mittheilungen, &c., des Artillerie und Genie-Wesens	Major L. C. M. Blacker.
Italy	Rivista di Artigleria e Genio	Major R.M.B.F. Kelly.
	„ Marittima ...	Major A. Samut, A.O.D.
Russia	Journal of Artillery ...	Major E. A. Lambart. Major G. T. Kelaart.
	Russki Invalid	Lieut. E. G. Cheke.
	Oruzhennii Sbornik	Capt. E. A. Campbell
Sweden	Artilleri-Tidskrift	—
	Tidskrift Sjöväsendet	—
Roumania	Cercul Publicatiunilor Militare	—
Brazil ...	Revista Maritima Brazileira ...	—

THE ADVANTAGES AND DISADVANTAGES OF Q.F. GUNS FOR ARTILLERY IN THE FIELD.

BY

MAJOR F. B. ELMSLIE, Royal Artillery.

"CIRCUMSPICE."

SILVER MEDAL PRIZE ESSAY, 1898.

SECTION I.—Introduction.

OF the enormous importance of the subject set by the Institution for this year's essay, there can be no two opinions. The development in power of guns and their projectiles—manifesting itself in one direction by high muzzle velocities, in another by vastly increased rapidities of fire, and in a third by the introduction of heavier calibres, and shells filled with explosives of a power and capacity for destruction far exceeding anything hitherto known—is merely a part of a prevailing military activity and competition among the greatest Powers of the earth which has probably never before been exceeded. This, coupled with the tornado-like suddenness of outburst and swiftness of decision of modern War, and the gigantic value of the interests involved, especially to our own country, now at this moment at a very zenith of prosperity and wealth, and which gigantic interests it is the function of our Navy and Army to guard—render it imperative that no pains should be spared to examine thoroughly every new development in material; to separate the sound from the unsound, and, while rejecting the latter, to take care that we do not lag behind in adopting the former, lest we should find ourselves confronted with superior armaments when the day of trial comes.

Animated therefore by no preconceived notions or theories, but with an honest desire to find out the truth, let us humbly try to examine into the advantages and disadvantages for Artillery in the Field of one of the above indicated lines of recent Artillery development, viz.: the introduction of quick-firing guns.

The point of view from which this question must be really regarded is not merely small technical details concerning the guns alone, but the suitability or otherwise of an Artillery thus equipped for the general service of a Modern Army. It is however desirable, and even necessary, to devote a small portion of space to examine whether there is anything inherent in Q.F. guns, as they at present exist, which unfits them for use as field guns, and this point will be dealt with in the next section.

SECTION II.

THE LEADING CHARACTERISTICS OF EXISTING QUICK-FIRING GUNS WITH SPECIAL REFERENCE TO THE SUITABILITY OR OTHERWISE OF EACH FOR ARTILLERY IN THE FIELD.

Quick-Firing Guns already exist, of all sizes, from the little 3-pounder and 6-pounder, to the great 6-inch firing a 100-lb. projectile, and even an 8-inch. Not only are there varieties in size, but, there are varieties of pattern among guns of the same size made by different makers, each having his own patents. Nevertheless all possess in some form or other the following characteristics.

1. A rapid breech action—all the minor operations of ejection of empty cartridge case, cocking the lock, &c., being automatically performed by the mere action of the breech lever in opening and closing the breech.
2. A greatly simplified ammunition (in the smaller natures made into a single cartridge like a large rifle cartridge).
3. The recoil of the gun is entirely absorbed by the mounting, and the gun itself automatically and instantly replaced in the firing position, after discharge.
4. The sights are arranged for continuous laying, *i.e.*, the layer can continually look over them, undisturbed by the service, or even the recoil, of the gun. They are generally fixed to the mounting and not to the gun itself, and in all cases can be manipulated without removal.
5. The gun is entirely under the control of the layer, who is independent of any other man for training or elevating.
6. The firing, is invariably done by the layer by means of a trigger or very short lanyard.
7. And, when great rapidity of fire is essential, only percussion fuses are used.

Running through these details *seriatim*, as to their applicability to field guns we find :—

1. *Breech Action.*—With our present mechanical knowledge, and numerous existing designs, there should be no difficulty in designing a pattern of gun to fulfil all requirements.

2. *Simplified Ammunition* generally takes the form of a metal cartridge case containing the charge, and percussion cap or other means of ignition, and, in the sizes below 12-pounder, holding the projectile in its mouth. With such ammunition, and with a suitably mounted gun, an extraordinarily rapid fire can be delivered—more than 30 rounds have been fired in one minute from a 3-pounder when the gun has not been laid.

But such ammunition possesses grave disadvantages for Field Artillery—the weight of the metal cases is considerable (that of even a 6-pounder weighs 2¼ lbs.), and this weight as well as the space taken up by the cases in the limbers reduces the number of rounds which can be transported in the carriages (aluminium cases have been tried but without success). Moreover this kind of ammunition is very liable to injury.

But is there any necessity for metal cases? Field Guns do not require such a tremendous rate of fire as is necessary for the Navy, where antagonists may often approach at the rate of 1,000 yards a minute, and where the very existence of a ship may depend upon the amount of fire she can deliver during a few fleeting moments. Coast defence guns also have to be capable of very great rapidity when required, owing to the high speeds of their targets. But the Field Artillery can be content with a far lower rate of fire.

As a proof that the metal case is not essential even for rapid rates of fire, stands the fact that in the very latest developments of Q.F. guns it has been found possible to do away with it.

In the *Times* of 15th December, 1897, there appears an account of the trials of a new pattern of 6-inch Q.F. gun, which beat all previous records as to speed, for a gun of that calibre, and in which the metal case is no longer used. Many of the rounds were fired within seven seconds of each other, in spite of the great size and weight of the gun and ammunition.

It may therefore be safely affirmed that a rate of fire amply sufficient for Field Artillery requirements can now be attained without the disadvantages of the metal cartridge case. And this from a Field Artillery point of view is a conclusion of the highest importance.

3. *Absorption of Recoil.*—There is no doubt that the full and complete absorption of recoil attained by Garrison and Naval mountings, and absolutely necessary for the high rates of fire and the high velocities of projectile required for those services, can never be obtained in a field gun mounting. But at the same time it is equally certain that a very good practical absorption, sufficient for the more moderate speeds of fire and more moderate velocities of field guns, is now quite possible, by the use of all latest mechanical devices and by a due adjustment of weight of projectile and muzzle velocity to the weight of gun and carriage. For the proof of this proposition we must turn to Foreign Powers. Germany and France have both, as will be shown hereafter, already given practical proof that in their opinion they have defeated this difficulty—and what can be done abroad can be done by ourselves.

It may therefore be taken as proved, that by a proper and up to date design, not of gun alone, or mounting alone, but of the whole system considered as a whole, the recoil may be so far absorbed that a field gun can be effectively fired with far greater rapidity than our present guns.

4. *Sighting* can be dismissed in a few words. Sights already exist which can be manipulated with great ease and clearness, and without being removed from the socket, and their position, &c., is merely a detail of design—no difficulty exists.

5. It is very difficult in a field carriage to give the layer full control over his gun without introducing complications, but as much as possible must be provided for.

6. *Firing Arrangements.*—A most important detail, and one deserving of a very large amount of space to itself, could such be afforded. All that can be said here is that there is no impossibility about designing some more or less automatic firing gear to fulfil the requisite conditions.

There can be little doubt that some sort of percussion firing gear, must some day supersede the present cumbrous system of tubes and lanyards, requiring several operations to put in the tube, work the lanyard, fire the gun, and remove the fired tubes.*

7. *Fuzes.*—Time fuzes can certainly not be abandoned for Field Artillery, and it appears possible that, in the case of a Q.F. Field Equipment, the rate of fire which could be maintained, might, unless careful arrangements be made to prevent it, be limited by the rate at which fuzes could be set.

It must be remembered however that there is no reason why two or even three men should not be setting fuzes simultaneously. With a non-recoiling gun requiring no running up, and the layer doing his own pointing and firing, the men at present engaged in those duties would be available and no difficulty need be apprehended on this score. It would resolve itself into a matter of drill.

It would appear from a consideration of the foregoing, each item of which appears to be clearly established, that, in the present state of our knowledge, there is no inherent impossibility in the proposal to make available the Q.F. type of guns for the use of the Field Artillery, provided that such an armament be considered suitable in other respects —whether this be so or not, will be considered in the following sections.

SECTION III.

THE ADVANTAGES OF A QUICK-FIRING EQUIPMENT FOR ARTILLERY IN THE FIELD.

These may be summed up under three general heads, each of the highest importance :—

1. Greatly enhanced intensity of fire.
2. Quick ranging, and
3. Less frontage required for a given amount of fire—or conversely a far greater amount of fire possible from any position of given extent.

1. *Intensity of Fire.*—It will be readily granted that the more intense the fire of which any arm is capable, the greater is its effect and the greater its chances of subduing its enemy.

Intensity of Fire has hitherto been striven for by bringing into the Field the greatest possible number of guns.

But supposing this to be equal, then Intensity of Artillery fire (shrapnel) can be arrived at in two ways, either by a very rapid succession of medium sized shell or by a slower succession of heavier projectiles ; each of the latter however releasing, on bursting, a larger number of bullets than each of the former.

Let us suppose for a moment that the two above systems are designed so equally that each is capable of delivering exactly the same number of shrapnel bullets per minute on the enemy's position, and that they are pitted against each other. There seems little doubt that, even assuming equality in number of bullets per minute, the former will prevail. For the rapid arrival of shell after shell will be most demoralizing. Most of those who have as boys played in the water while bathing are aware how much more difficult it is to face a continuous and rapid splashing, even of small drops, than to endure the same quantity of water dashed, say in bucketfulls, at comparatively large intervals. The former allows no time to take breath. In the case of shrapnel fire there can be little doubt that the effect on a battery—or on any other arm—of a shrapnel fire, arriving at the rate of say twenty shells per minute, would be far more demoralizing than the same number of bullets released from shells arriving at the much slower rate of say six rounds per minute. Bewildered by the incessant bursting of shells, without time to repeat orders, to replace casualties, or even to clearly descry the enemy, the best officers and layers would be terribly handicapped, their return fire will be slow and ineffective, and the slower Artillery will be overwhelmed.

---

* Possibly a very small detachable magazine, like that of a Lee-Metford rifle on a small scale, and containing small percussion cartridges, slipped into guides on the breech at the moment of coming into action, automatically worked by the block, and its lock fired by a trigger or short lanyard or toggle, would be found highly suitable for the class of gun now under consideration : of course when exhausted a fresh magazine could be instantly attached. The supply of full magazines would be carried in pockets along the sides of the trail.

The above is believed to be true, even should the numbers of shrapnel bullets capable of being delivered per minute be equal. But this is far from being the case.

What actual rate of fire may we reasonably expect from a Q.F. field equipment? For data we have the known capabilities of garrison Q.F. guns of about the same calibre, from which however a considerable deduction must be made to allow for the more unfavourable conditions of a gun in the field, as regards steadiness of mounting and absence of recoil. We also know pretty well how long is required for the actual operation of laying, when this is under the control of the layer alone who is not dependent upon others.

With a target of good visibility and fair size, even though it may be in fairly rapid motion, it is believed that a garrison 12-pounder Q.F. gun could maintain a rate of aimed fire of 10 rounds per minute—at a stationary target it could certainly be done with ease.

If we halve this to allow for the more unfavourable circumstances in the field, we get a possible rate of 5 rounds per gun per minute.

Checking this by the time taken to lay a gun, without the delays involved by signalling to the number at the trail, there is no doubt that any fairly good layer can finish his laying in from 12 to 15 seconds; of course fumbling with the sight, &c., is not taken into consideration, as vastly improved sights would of course be fitted.

There therefore seems no doubt that with a target of fair visibility, any Q.F. field equipment worthy of the name should be able *when required*, to pour in a fire at the rate of from 4 to 5 rounds per gun per minute, or a total rate from the battery of 24 to 30 rounds per minute, an intensity far surpassing anything hitherto known.

Examples are hitherto wanting of the effect of Q.F. guns in the field. But since the effect of what may be termed a storm of artillery projectiles, is much the same, whether these come from a few Q.F. Guns or a large number of ordinary guns, we can find in History examples in proof of what has been said above. For instance, speaking of the German guns at Sedan, von Moltke says ("Moltke's History of the War"): "And now the fire from the 26 batteries of the Army of the Meuse was joined by that of the Guard's Batteries, which took up their position at the Eastern Slope of the Givonne Valley. The effect was overwhelming. The French Batteries were destroyed, and many ammunition waggons exploded."

This instance of the effect of an intense fire was produced by numerical superiority of guns. But a similar intensity will be a property of a Q.F. equipment when the number of guns are equal.

Taking then a possible rate for a battery of 20 rounds per minute as well within the mark, it is evident that such an armament will have an immense advantage in fire effect over existing equipments.

It is perhaps hardly necessary to point out that in speaking of rates of fire of 20 to 30 rounds per minute it is not intended to argue that such rates would be used for long periods and under all kinds of circumstances. Rather are they to be considered as a potentiality—a latent power—capable of being developed at critical moments, and adding to that Artillery which can first and best realize the true possibilities of this new property of the arm, and which can best train its officers to make full use of this property, a commanding power on the field of battle.

2. *Quick Ranging.*—Of more importance than the preceding, is the power of quick ranging, some development of which must form a leading feature in the true use of a Q.F. Armament.

The vital importance of Quick Ranging cannot be over-estimated. There can be no reasonable doubt, that, with the present accuracy and efficiency of artillery, if two practically equal masses of that arm come into action against one another, that side which first establishes the range, and first commences to pour in the terrible fire above described, will in all probability overwhelm its adversary, and this too while suffering but little loss itself.

Even in 1870 when only common shell (which we now consider as a quite ineffective projectile) were in use, ranging, in the face of guns which had already got the range, was in many cases found to be impossible, or at any rate very difficult.

Prince Kraft in one of the personal reminiscences contained in his letters (p. 149), gives a graphic description, too lengthy to quote here, of the difficulties experienced in ranging, against an enemy who has already got, or nearly got, your own range. And he also incidentally mentions that at Sedan the process of ranging the German Batteries, with which he himself was connected, took over an hour, owing to the enemy having first got the range.

Again, referring to Gravelotte, when the line of German guns was established between the Bois de la Cusse and Gravelotte, Hoffbauer tells us :—" Repeated attempts made by the French to bring fresh batteries into action were invariably baffled by the accuracy of our concentrated fire. Many of the guns could not even unlimber, and others which succeeded in doing so were obliged to retire after firing a few rounds. Explosions of ammunition wagons and limbers were frequently observed."

If this were the case with the armaments of 1870, what chance would batteries have of successfully ranging under the rain of bullets from bursting shrapnel delivered by a Q.F. equipment ?

Speed therefore in ranging is all important, and there can be no doubt that a Q.F. armament will lend itself very readily to improvements in this direction. The value of minutes—nay even of seconds—at this vitally important crisis—for crisis it is when well-trained Artillery meets well-trained Artillery on the modern battle field—is not to be described in words, nor measured by ordinary standards. The slower Artillery will pay for those precious minutes with the lives of many gallant men and horses. Its influence on the battle field will be nullified —the other arms, looking to their Artillery for support, will look in vain, for it will be reduced to impotence—and woe to that Army and to that Nation whose Artillery is over-matched.

The laying of stress on this point is by no means intended as a criticism of present methods, the outcome of so much thought and practical experience, and so well adapted to the armaments now in use. But there can be no doubt that the property of the Q.F. gun, of being always ready and able to fire, should be utilized, if it possibly can, in making improvements in this direction—*autre temps autres mœurs*—new armaments new methods—and that several new departures in ranging will be possible with Q.F. guns is evident. True we shall have to pay a price for the time that we shall gain, viz. : the expenditure, on the process of ranging, of what we should at present regard as a somewhat reckless amount of ammunition ; but what is the value of a few shells compared with the tremendous interests at stake when Artillery has to get the mastery over Artillery or be itself destroyed.

No ; time must be gained by every possible means, and the introduction of a new armament would be useless were our tactics not modified so as to take full advantage of its peculiar properties and powers.

3. *Frontage.*—The property which a Q.F. armament possesses, of delivering a vastly more powerful fire than has hitherto been possible from any given length of front, or conversely the smaller amount of frontage required, for the delivery of a certain amount of fire is one of very great importance. For the continental Powers, who have hitherto brought gigantic numbers of guns into the field, it will now be possible to reduce this number, and the crowding of large numbers of guns into positions too small for such numbers, or the squeezing out of batteries altogether from the artillery line on account of want of space—as was the case in the German line at Gravelotte for instance—will be less frequent than formerly.

To a nation like ourselves, always too weak in artillery, and hitherto quite unable to compete in numbers of guns with the huge armaments of our neighbours, the increase of fire power from our limited number of pieces, taken in conjunction with a probable reduction in the numbers of those of our neighbours, is an unmixed advantage, as tending to bring matters more on an equality. Abroad, the gain in power of guns must be partially counterbalanced by a reduction in their present numbers, necessitated, as will be seen immediately, by difficulties as to ammunition supply for very large numbers of guns of this type. In our case owing to our smaller number of guns, we need think of no reduction, and the gain in fire power would be absolute.

SECTION IV.

THE DISADVANTAGES OF A Q.F. EQUIPMENT FOR ARTILLERY IN THE FIELD.

These may be enumerated as follows :—

1. The great expenditure of ammunition and consequently large amount necessary to be provided and always at hand.
2. The excessive length on the roads of the ammunition columns and parks.
3. The difficulty of keeping up the supply of ammunition to the guns at the required rate in action.
4. The greater complication of gun and mounting rendering it unfit for service in the field.

5. The possible sacrifice of mobility owing not only to the greater amount of ammunition to be transported but to the possibly greater weight of gun and carriage.

6. The possible loss of shell power due to modification in calibre of gun, weight of projectile, and muzzle velocity.

7. The necessity for still higher training of personnel—officers and men.

1. *The Expenditure of Ammunition.*—It is of course obvious, that guns of the type under discussion will, from their very nature and properties, demand a very large supply of ammunition. But how much? Will the amount required be within practical limits, or are the dreams of those who picture the field battery of the future as consisting of two Q.F. guns and twelve or more ammunition waggons, actually near the truth.

How many rounds per gun will be required in the field for a Q.F. field equipment? This must form the very basis upon which the whole design and organization of such an armament must be founded. The question, vitally important as it is, is unfortunately one as to which practically no reliable data appear to exist, and the true answer must be left to the matured judgment of our most experienced officers. But as for the purposes of this memorandum, it is necessary to have some figures to go upon, it has to be discussed.

If we examine the expenditure of ammunition by the German batteries in 1870, as given by Hoffbauer, it becomes clear that no general law can be deduced, even from this large record of actual experiences. The expenditure is dependent upon so many circumstances. Some batteries come into action much earlier than others, some find themselves in the very focus of the struggle, while others find their allotted part on some comparatively distant eminence. The very combat itself may be short and decisive or lengthy and protracted. We thus find such discrepancies as the following:—On August 14th, at Worth, of the Artillery of the 1st Army corps, the 1st light field battery fired 302 shell and six case, while on the same occasion the 3rd light and 4th light batteries only fired one shell each. The general averages on this day were:—

1st A.C. and 1st Cavl. Dn. (15 batts.), 137 rounds per battery.
7th A.C. ... ... (9 „), 75 „ „
9th A.C. ... ... (2 „), 51 „ „

General average of the 26 batteries engaged, 110 rounds per battery.

On August 16th, at Vionville, the expenditure of individual batteries varied between 1,164 rounds by the 3rd Horse Artillery Battery of 3rd Corps, and 1,148 of 1st H.A. of same corps, down to 38 and 41 respectively by 2nd heavy and 1st light of the 9th Corps. The 15 batteries of the 3rd A.C. averaged 768 rounds each, and the general average of 36 batteries engaged works out at 545 rounds each.

On August the 18th, the great day of Gravelotte, while two batteries of the 9th Corps fired close on 1,000 rounds each, no less than eight batteries fired less than 10 rounds each.* The average expenditure of the 9th A.C. was 526 rounds per battery, and the general average of 109 batteries works out at 318 rounds each. Although at first glance such variation even of large averages appears somewhat hopeless, yet it incidentally leads to one most important conclusion. It is this: that, in future organizations, the great bulk of the ammunition supply must take the form of free ammunition, not tied to particular batteries; and only sufficient need be with each battery to keep it supplied for a moderate time. It is evident that if every battery had to carry with it an enormous train of wagons, containing sufficient ammunition for all probable requirements, there must be great waste of road space and mobility as probably only a few batteries would expend the full amount carried on any particular occasion. This consideration effectually disposes of the two gun and 12 wagon theory, and gives a most important and valuable principle to go upon, viz.:—

---

* Three batteries only fired one round each, one fired two rounds and two only three rounds each.

That in organizing a Q.F. field armament no excessive amount of ammunition supply should be provided with the batteries, but that the extra ammunition, necessitated by the different type of gun, must be entirely carried by a highly-developed and well-organized system of ammunition columns, which has to be created. Very stringent regulations will also be required that other troops are to make way for the advance of ammunition columns.

We are however at present no nearer to estimating the actual number of rounds required, than before. But when we find that in the great battles of 1870 it was quite exceptional for a battery to fire more than 1,000 rounds in any one battle, and that batteries which did this were those which had been brought earliest into the fight, and been most actively engaged; as for instance Korber's Horse Artillery Batteries at Vionville, which, commencing by surprising the French camps soon after 8.30 a.m. were engaged in a more or less continuous struggle till darkness put an end to further fighting—we see that in those days 1,000 rounds per battery would have been an amply sufficient supply of ammunition for any one day, and the German rate of "rapid fire" was more rapid than our present rate.

Several battles in quick succession, as happened round Metz in 1870, have however to be provided for.

To estimate the expenditure of Q.F. guns it must be remembered that although the fire may be at times very rapid, yet the production of effect will be also very rapid. In fact, granted good fire discipline and good shooting, there seems no special reason why more projectiles should be required to attain a given result when the fire is rapid than when it is slow. Nay, the very fact of producing results rapidly, is of itself a factor of great power. It would almost appear possible that for any given object fewer rounds will be required to produce decisive results, than before. But the batteries will not permit themselves to remain idle, and therefore more rounds will certainly be used in the day's work than with slow firing equipments.

We turn to the infantry, to see what increase they have made in their supply of ammunition since they adopted Q.F. rifles—for the so-called "magazine" is simply a Q.F. rifle as compared with former patterns—but it is not at all easy to ascertain what has been the average increase in the number of cartridges carried per rifle, since this was adopted by all the great powers. So far as can be made out the total number of rounds per rifle taken into the field appears to have been about doubled. The writer is not aware how far this increase has been based on detailed estimates, or whether it has been merely a rough increase. It is probably, for infantry, an abundant estimate, as, although, in individual cases of regiments hotly engaged, the amount may become exceeded—over the great bulk of a whole army, there is sure to be a plentiful supply.

Artillery expend more ammunition in proportion than infantry, as they come into action early, and remain in action until all is over, moreover nearly every gun is engaged, while whole battalions stand in reserve without firing a shot. It may therefore be safely said that the increase in artillery ammunition should be at least as great as the increase in infantry ammunition due to the same cause, viz., the introduction of a Q.F. arm. It must not be forgotten that part of the German artillery was short of ammunition for some time after the continuous fighting in August: some of the batteries being short for several weeks in spite of the strenous efforts of the columns.

It is somewhat difficult owing to recent changes in equipment, and the somewhat inchoate condition of our ammunition columns and parks to ascertain exactly how many rounds our artillery at present are supposed to carry. But it is undoubtedly putting it very near the mark to assume that (supposing 12-pounder ammunition to be in question) we could, without any great alteration to the establishment of ammunition columns and parks at present understood to exist, carry with the army for each battery, the following number of rounds, viz.: with battery 816, in ammunition columns, 450 (about*), and in park, 434. Total, 1700 rounds per battery.

It would appear therefore from the above reasoning that a Q.F. equipment necessitates the provision, and carrying in the field, of at least 3,500 rounds per battery. It further appears that about 1,000 rounds is all that should be carried by the battery itself, leaving 2,500 rounds per battery to be divided between the columns and park.

It would seem desirable, for many reasons, to have as much as possible of this with the columns. In round numbers we might suggest 1,000 rounds per battery with the columns, leaving 1,500 rounds in the park.

This very formidable result brings us to the next disadvantage to an Army in the field, viz.:—

2. *The excessive Length on the Roads of the Ammunition Columns and Parks.*—This is a serious drawback to a Q.F. equipment, especially when it is remembered that some batteries may very possibly be in need of the ammunition columns quite early in the fight, and these must therefore be well to the front.

It is quite evident that a most radical change in the present arrangements is absolutely necessary, and the lumbering unwieldly ammunition column, dragging its slow length along the roads, must be supplemented by some light and mobile units, well officered, and capable of moving at good speed across country.

The ammunition columns might then be organized as follows:—

All existing columns be retained and organized as at present, but each Army Corps to have four additional flying columns, each consisting of 22 carriages under command of a captain.

The very interesting tables marked A to D in the appendix show exactly the effect on the Artillery impedimenta, taken as a whole, of the above indicated changes. Table A gives the length of road occupied by each nature of ammunition column as at present constituted (Field

---

* Apparently each Divisional Ammunition Column carries 444 rounds per battery for the Divisional Artillery, while the Corps Column together with the Cav. Bde. Column 462 for the Corps Artillery.

Army Establishments, Home Defence, 1892*). It also shows the amount which could be deducted from each if the Infantry ammunition were separated from that of the Artillery. This table serves as a foundation for Table B, which compares the road space occupied by the ammunition columns organized as at present with those organized as proposed.

Table C gives a similar comparison for the batteries themselves of the A.C., while Table D combines the two preceding and gives the exact total space occupied by the Artillery of an A.C. under the two systems. The total difference is 2,700 yards. Distributed over three roads the difference is only 900 yards on each road, a small price to pay for the advantages of a better weapon.

The immense importance of the work of ammunition columns would have to be recognized.

Cadres for the full number required would have to be kept up in time of peace and constantly used. When not being manœuvred with the brigade division special attention would be devoted to cross country marching.

Although spoken of as ammunition columns, the new units would be better described as the second échelons of wagons. They would not receive, nor expect to receive, any orders from their Bde. Dn. Commanders. It would be their duty to make their way to the front, across country when necessary, and to report their arrival to their Bde. Dn. Commanders at the earliest possible moment after firing has commenced.

Stringent regulations would have to be issued that on no account are ammunition columns to be blocked, and in time of peace the other arms should be habituated to the constant presence in the field of numerous columns, making their way independently to the front in whatever manner seems best to them.

So far as the Parks are concerned they would remain very much as at present, but with the exception that, to save space on the roads, the additional wagons carrying the extra rounds, over and above those now provided for, would only be drawn by one pair of heavy horses each. Sooner or later it seems certain that steam traction (or other motor power) must be applied to military uses, and an enterprising nation might initiate something of the sort. The saving in length of columns would be very great—the possibility of danger is, with modern ammunition and methods of packing, so small as not for one moment to be allowed to weigh against the advantages. Of course proper engine drivers and a few fitters and other mechanics would have to be with the park.

3. *Difficulty of keeping up the supply of Ammunition to the guns at the required rate when in action.*—This could be overcome by an extension of the portable magazine system to the whole packing of all the carriages; shells would no longer be packed individually but in groups of three or more, fastened together by a steel band or some such contrivance, each group having its cartridges with it in the same magazine. Each of these would be removed bodily from the wagon and supplied to the gun *holus bolus.*

The gun being non-recoiling, the wagons might be brought up much closer to them than at present.

4. *The greater complication of Gun and Mounting unfitting it for service in the Field.*—This is a vague and general objection

---

* Columns for service abroad apparently only differ in the addition of one wagon for tents.

which cannot be dealt with specifically until we have before us an actual gun and carriage. But speaking generally we all hate and fear complication.

There can be no doubt that simplicity, and extreme simplicity, should always be kept in view, but it must not be allowed to over-ride all other considerations.

We must not forget that the introduction of breech-loading guns was viewed with immense disfavour, and actually deferred for some years on this very ground. They are doubtless much more complex than the muzzle-loaders they succeeded, and yet how little noticeable is this now that they are thoroughly known.

Again, the undoubtedly complicated Maxim Gun was looked at askance, until tried by private enterprise in S. Africa and found a success in the field. Here again the misgivings proved unfounded.

An apparently striking instance of the disadvantages of complexity is afforded by the introduction in its original form of what is known as the Mark II. carriage, designed as an improvement on the Mark I. pattern, but which experience showed to be full of defects, many of them serious. This will doubtless be remembered and quoted in support of the above objection.

But it is only right to remember that this pattern showed no practical advantage to set off against its added complexity and weight. Had it for example been a non-recoiling carriage, requiring no running up after firing, it might possibly have been forgiven its cumbrous and unwieldly tyre brake gear. Had a markedly superior rapidity of laying been obtainable from its traversing gear, this too might have been viewed with less disfavour; but seeing that there were no tangible advantages to compensate for the extra complexity and weight, it is not surprising that it was disliked, and has since been stripped of most of its complexities.

It is probable that with the wider knowledge now available, especially in this matter of very powerful springs, new designs of carriages, while possessing immense practical advantages, would not necessarily be very complex, while the guns themselves may very likely be even simpler than our present ones.

One thing is quite clear, that to avoid complexity, both gun and carriage must be designed together as one system, not as two separate items.

5. *The possible sacrifice of mobility owing not only to the greater amount of ammunition to be transported, but to the possibly greater weight of gun and carriage:*—It has already been shown that the transport of the extra ammunition should make no difference to the mobility of the batteries themselves. With reference to the weight of gun and carriage, as this is greatly mixed up with the size of gun and projectile likely to be adopted, it is convenient to discuss at the same time the next disadvantage, viz. :—

6. *The possible loss of shell power, due to modifications which may be found necessary in calibre of gun, weight of projectile and muzzle velocity.*—It is as well to be quite clear on one point. If the adoption of a Q.F. equipment be found to necessitate any real and serious loss of mobility, of the batteries, it cannot be thought of.

The key to the whole of the vast subject opened up by these two objections lies in one word, viz. : Recoil.

We have seen in Section II. that a practical abolition of recoil is a *sine qua non* if any of the advantages of rapid fire are to be obtained by artillery. It is not reasonable to suppose that by mechanical means alone we shall be able to entirely absorb the violent recoil of our present guns, and, even if we could, the necessary arrangements would undoubtedly add to their already high weight. The problem must be attacked from another side.

The energy of recoil of the system (gun and carriage), which is what we have to absorb, can be varied as we all know, either by increasing the weight, thus absorbing a larger amount of the shock before motion is established, or diminishing the shock by reducing either the weight of projectile fired, or the muzzle velocity given to it, or both.

It is quite evident that weights can in no case be increased. It will therefore be necessary in all probability to reduce either the weight, or muzzle velocity, of the projectile, or both. Though some shell power be lost by reducing the weight of projectile, yet the general lightening of load of all the wagons will be no small advantage, as a set off.

Let us try to find out exactly what this loss of shell power will amount to. What combination of weight of gun and carriage, weight of projectile and muzzle velocity, will give a manageable amount of recoil?

And here we are confronted with a difficulty which can only be solved by experiment. Supposing for the sake of comparison that the energy of recoil be measured in foot tons, how much is permissible?

Tables E and F of the appendix give the recoils of our service guns, and those due to other imaginary combinations of the various data. All are worked out by the ordinary text book formula, and serve for comparison.

Table E deals with data and recoils familiar to us all, and affords some sort of standard by which to realize the figures of Table F.

Doubtless by the employment of the methods largely used on the Continent, such as a broad spade at the end of the trail and very powerful springs to take the first shock, the recoils of our service guns could be considerably absorbed and thus shortened. At the same time no one can doubt that in both guns the amount of recoil is too much for complete absorption.

In Table F only round numbers and wide margins are given, the comparisons being in pairs, lettered A, B, &c., respectively. A comparison with Table E shows that there are many useful combinations giving smaller recoils than the present service guns.

It is impossible without actual experiment to say exactly what nominal energy can be successfully absorbed. Probably, by the use of proper means, a recoil of 0·8 to 0·9 ft. tons would be found quite controllable.

Calibre.—Before proceeding further it is well to consider whether the calibre should be reduced. The Infantry have thus solved all their ammunition difficulties, but in their case a small bullet is as efficient as a large one. But though in the case of Artillery the shells of smaller calibre pack closer, and though the breech block and other parts of the gun may be made smaller and therefore lighter, yet the great loss of bullet-carrying capacity in small calibre shells makes these very inadvisable for Artillery. We find in our own service that all the following guns have the same calibre, three inches, viz.:—15-pr. B.L., 12-pr. B.L., 7 cwt.; 12-pr. B.L, 6 cwt.; 13-pr. R.M.L., 9-pr. R.M.L., 8 cwt.; 9-pr. R.M.L., 6 cwt.; and 7-pr. R.M.L.

When this calibre has been at various times adopted for guns of such various powers as those in the above list, it is evident that it is generally suitable for field service. Moreover its adoption in conjunction with a 12½-lb. projectile would enable us to utilize our stocks of well-known and tested projectiles, and save us from having to design and try new ammunition as well as new guns. It should not therefore be reduced.

We are now in a position to estimate the general possibilities of a Q.F. equipment.

Mobility is the first essential—the weight behind the team with four gunners mounted should if possible be kept down to 38 cwt., or say 4,300 lbs. Of this the limber with two men would require 2,000 lbs.; this leaves 2,300 lbs. for the gun and carriage with two men on the axletree seats, or 2,000 lbs. when unlimbered in action.

Next, an energy of recoil of 0·9 ft. tons should not be exceeded, while if possible a 12½-lb projectile should be adopted.

A glance at Table F leads us to the conclusion that with above data a muzzle velocity of about 1,350 to 1,400 f.s. will fufil the requirements.

It will be observed that, before the weight of the present 15-pounder is reached, there is a margin of 450 lbs., which, if necessary, can be added to gun and carriage, either to supply additional strength, or, by mere inertia, to reduce shock. But on no account whatever should the weight of the 15-pounder equipment be exceeded.

Although 1,400 f.s. appears a low muzzle velocity, a study of Table G in appendix shows how very little is really lost at most ranges by the reduction from 1,540 f.s. the M.V. of the horse artillery gun: only about 5 per cent at medium ranges.

We therefore conclude that a Q.F. equipment does not necessarily involve any loss in mobility, while the loss of individual shell power is limited to the substitution of a shell containing 162 bullets for one containing 200 and a lowering of velocity for practical purposes of only about 5 per cent.; against which must be set off the fourfold increase in the rate of fire. Table H in appendix sets forth the comparison in fire effect between such an equipment and the present service equipment, and shows an overwhelming superiority for the Q.F.'s.

7. *The necessity for still higher training of personnel—Officers and Men.*—There can be no doubt that an equipment of a distinctly higher order, will demand corresponding advances in the training of its personnel. But this can safely be left to our officers and men. Calls made upon them have always been responded to. It will however be very desirable to give extra pay to trained and efficient gun layers, as is at present done in the garrison artillery.

SECTION V.

THE BALANCE BETWEEN THE ADVANTAGES AND DISADVANTAGES.

Having now carefully gone through the leading pros and cons of the whole subject, it behoves us to weigh them well. Momentous indeed is the question under consideration, for on the decision may hang the issue of our next struggle against the armed Nations around us. Great are the advantages set out in Section III., and if fully realized in practice, they must be overwhelming. But great, too, are the disadvantages. On the one hand, we have an established armament, a system suited to that armament familiar to all ranks of our widely scattered regiment, and which has been the natural growth and outcome of many years experience, study, and work. On the other side lie vast possibilities indeed, but some uncertainty, for it is abundantly evident that the introduction of an armament possessing such different properties and powers to that at present in use, implies the introduction of new Tactics.

But whilst the consideration of details on either side, tends to confuse the mind, with the complexity and variety of the numerous avenues of thought opened up before us, let us, in our search for guidance, lift up our eyes and look around.

The scene changes.—Viewed from a more lofty standpoint, the tangled maze of advantage and disadvantage, of doubts and difficulties, sinks beneath our feet and assumes its true proportions.

What do we see ?

In every country, in every department of commerce, and industry, we see one prevailing tendency towards an increase of speed. Broadly speaking, this is the general line along which all things are moving, some, so to speak, of their own initiation and volition, others unwillingly forced along this line of progress by the mighty and resistless march of events. Within recent years we have seen the effect on business of the introduction of rapid communication through the telephone ; ships cross the ocean at speeds steadily increasing ; in the designs of vessels for warlike purposes, higher and yet higher speeds are continually being aimed at, while the immense, but slow working guns, formerly in use, have been discarded in favour of Quick Firers. Coast defence guns are following the same lines. The infantry of all nations have adopted quick-firing rifles—for such is the true property of the so-called magazine rifle—and the even more rapid Maxim and other automatic shooting machines have been introduced. Even to the individual, cycles have given power of rapid locomotion previously unknown, and year by year we find these geared to higher speeds.

Where, in fact, can we turn, without seeing clear evidence of this tendency of the times ?

Should however, any be disposed to think that this universal tendency may have one exception—that that exception is in the matter of Field Artillery—and that consequently Field Artillery can stand fast in its present condition of efficiency, and view with indifference the striding progress of all round—let these consider the following extracts taken from the ordinary daily press during the last few months.

In the *Times* on the 29th of June, 1897, there appeared among the telegrams from Berlin, a short note on the work of the German Reichstag during the session, 1896-97. The following little sentence is pregnant with meaning and warning : "A vote of 44,000,000 marks for the introduction of Quick-Firing Artillery was quietly passed with the approval of all parties except the Socialists."

Five months later, in the *Morning Post* of 15th November, 1897, appeared the following paragraph : "The transformation of the French Field Artillery is so far advanced that 100 batteries of six pieces each, are already available for service. Detachments from each Artillery Regiment are being trained to use the new guns at Chalons. The secret has been well kept. The new weapon is called the "Déport gun" after Colonel Déport its inventor. It is of course Quick-Firing, and throws steel shells of 75 milimetres calibre. The Déport gun is said to be far superior to the present German Artillery, and to have no recoil owing to an ingenious mechanism."

In the face of the above, can anyone doubt that the time has come for the re-armament of our Horse and Field Artillery with an up-to-date weapon.

Two great Nations, with full sense of the great responsibilities involved, have taken the plunge, and is not this a proof that in the opinion of many great authorities the balance of advantage and disadvantage is on the side of the improved weapon.

It has been suggested by some as a kind of compromise, that the Horse Artillery only might be re-armed, leaving the Field Artillery as it is. It is submitted that the whole of the foregoing plainly demonstrates the fallacy of such a view. The success of a Q.F. equipment, must depend on interchangeability and organization. Partial measures would rather weaken than strengthen our position, and if re-armament be decided upon, every gun that may be brought face to face with modern continental artillery, should be of the same up-to-date pattern.

Artillery, like the Navy, is a service that depends greatly for its efficiency on the character of its material. No amount of devotion or self-sacrifice on the part of its personnel can compensate for inferiority in armament ; and, like the Navy, its equipment should be always of the very latest quality.

SECTION VI.—CONCLUSION.

What is to be on the side of the superior artillery ? Ask of the long, steady line of German guns at Gravelotte on an August afternoon some 30 years ago ; before whose mighty fire, the opposing batteries were incessently moving and shifting position. Ask too, of the immense horseshoe of German batteries deciding the destiny of the French Empire on September 1st, 1870. To see what it is to be on the side of the inferior artillery, let us regard the unfortunate French batteries at Sedan, destroyed, in spite of gallant effort, by the terrible storm of artillery projectiles coming from the surrounding heights.

What is it to an Army to possess the superior artillery ? The main feature of the Franco-German War was the commanding use made by the Germans of their artillery—the mighty power of this arm wielded as it was in masses—that is, producing its effect by means of a heavy and pitiless storm of projectiles—again and again exerted a tremendous influence on the fortunes of the battle fields.

What is it to a Nation to have the superior artillery ? So far as we are aware, the teachings of all History show that Victory has always declared for that side which has developed the most powerful Artillery—and victory in battle means success in the campaign. Think of the cost of an unsuccessful war—the waste of life ; the loss of prestige and power, trade and commerce, territory and money ; what is the cost of an up to date armament in comparison with the many milliards of a war indemnity.

The importance therefore of a correct decision in the matter of artillery equipment is gigantic. The new conditions of things deserve the most careful consideration of our highest authorities, and should this consideration be found to establish the fact that a Q.F. equipment will have a decided superiority over existing armament, then let us boldly ask the Government and the country for the money necessary to place our *materiel* on an equality with that of other Nations, and enable our artillery—strong in the power of an intense fire when required—to perform its grand function of sweeping away all opposition in front of it, and—as has been well said by a great gunner—of opening up, for the other arms, the Road to Victory.

APPENDIX.

TABLE A.

The length of road occupied by each nature of Ammunition Column.

Character of Vehicle	Nature of Column					
	Corps		Divisional		Cavalry Brigade	
	No.	Total Length, yds.	No.	Total Length, yds.	No.	Total Length, yds.
6 horse at 19 yds. each	24	456	25	475	9	171
4 „ 15 „ „	6	90	3	45	1	15
2 „ 10 „ „	2	20	10	100	8	80
Spare horses say		24		28		16
Add about 20 per cent. for tailing, say		120		132		58
Totals ...	32	710	38	780	18	340
Deduct length of vehicles carrying Infantry ammunition only ...		60		330		70
Balance—space taken up by Artillery ammunition only		650		450		270

TABLE B.

Comparison of road space required for the Ammunition Columns of an Army Corps with present, and with a Q.F. Equipment.

Nature of Column	Present Equipment		Q.F. Equipment	
	No.	Total length, yds.	No.	Total length, yds.
Corps Ammunition Column at 710 yds.	1	710	1	710
Divisional do., at 780 yds.	3	2340	3	2340
Cavalry Brigade, at 340 yds.	1	340	1	340
Additional light flying Columns, carrying 550 rounds per Battery or 8,250 rounds per A.C., packed in wagons each carrying 92 rounds—say 90 wagons at 20 yds. each	...	...	...	1800
Total ...		3390		5190

TABLE C.

Comparison of road space occupied by the Batteries of an Army Corps with present and with a Q.F. Equipment.

Nature of Item	Present			Q.F. Equipment			Remarks
	No.	Length, yds.		No.	Length, yds.		
		Each Batty.	Total		Each Batty.	Total	
R.H.A. Battery... ...	3	300	900	3	360	1080	With the Q.F. Equipment three extra wagons per battery.
Field Battery	12	240	2880	12	300	3600	
Distances at 45 yds. each, Bde. Division ...			180			180	
Totals ...			3960			4860	

TABLE D.

Comparison of total length on roads of Artillery impedimenta of an Army Corps with present and with a Q.F. Equipment.

Nature of Item	No. of Yards occupied by	
	Present	Q.F. Equipment
Batteries (from Table C.)	3960	4860
Columns (from Table B.)	3390	5190
Totals ...	7350	10,050

TABLE E.

Energies of Recoil of Service Guns.

Nature of Gun	Projectile		Weight of Gun and Carriage lbs.	Recoil	
	Weight in lbs.	M.V.		Velocity of in ft. secs.	Energy of in ft. tons
12-pr., 6 cwt. ...	12½	1540	1800	10·7	1·4
15-pr.	14	1570	2500	8·7	1·3

TABLE F.

To show effect on energies of Recoil of varying (1) weight of gun and carriage, marked A; (2) weight of projectile, marked B; (3) muzzle velocity, marked C and D.

Distinguishing Mark	Projectile		Weight of Gun and Carriage lbs.	Recoil	
	Weight lbs.	M.V.		Velocity, ft. secs.	Energy, ft. tons
A	12	1400	**2500**	6·7	0·75
A	12	1400	**2000**	8·4	0·95
B	**15**	1400	2000	10·5	1·45
B	**10**	1400	2000	7	0·65
C	15	**1500**	2000	11·25	1·75
C	15	**1000**	2000	7·5	0·75
D	10	**1500**	2000	7·5	0·75
D	10	**1000**	2000	5	0 34

N.B.—Of course intermediate values can be interpolated between the extremes of each pair. The variable is emphasized in each case.

TABLE G.

Comparison of remaining velocities at different ranges due to a reduction of muzzle velocity from 1540 f.s. to 1400 f.s. in a 12-pounder projectile.

	Remaining Velocities at				
	Muzzle	1000 yds.	2000 yds.	3000 yds.	4000 yds.
	1540	1137	947	823	726
	1400	1059	907	793	699
Differences ...	140	78	40	30	27
Percentage of velocity lost ...	9 p.c.	6·8 p.c.	4·2 p.c.	3·6 p.c.	3·7 p.c.

TABLE H.

INTENSITY OF FIRE.—Comparison of the number of bullets per minute which could be delivered on an enemy's position by a Battery equipped with the 15-pr. and one equipped with the 12-pr. Q.F.

Equipment	Weight of projectile, lbs.	No. of bullets in shell	No. of rounds which can be fired in one minute	No. of bullets delivered per minute on enemy's position
Service, 15-pr....	14	200	6	1200
12-pr. Q.F. ...	12½	162	20 30	3240 4860

A difference in effect which must be quite overwhelming.

THE ADVANTAGES AND DISADVANTAGES OF Q.F. GUNS FOR ARTILLERY IN THE FIELD.

BY

MAJOR N. B. INGLEFIELD, ROYAL ARTILLERY.

G. F. R.

"NE PAS AVANCER, C'EST RECULER."

SILVER MEDAL PRIZE ESSAY, 1898.

At a time when all Europe is considering the re-armament of its Horse and Field Artillery, the subject selected for this essay must be one of especial interest. All nations recognise that the army which in time of battle can bring forward the most efficient Artillery, will undoubtedly establish a superiority over its adversary of the greatest value. Considerable diversity of opinion, however, exists as to how this superiority can best be achieved. Doubts are entertained as to whether Q.F. guns can be adapted to the requirements of Field Service, and if so, whether their adoption will confer any decided advantage over the rapid loading and excellent Field Artillery now possessed by ourselves, and by all Continental Nations. It is the consideration of this question that we have now to deal with. Before any conclusion can be arrived at, it will be necessary to compare the relative merits of quick-firing and service field guns—in a measure—as regards their equipment, but chiefly in respect of their tactical employment under the various conditions in which they may be called upon to act.

It will be convenient to divide the analysis of this subject under the following headings—

I.

Changes in material, ammunition supply, etc.—necessitated by the introduction of Q.F. guns—considered, so far only, as the employment of Q.F. Artillery in the field, is affected thereby.

II.

Tactical employment of Q.F. guns—

I. General considerations.
II. In the attack and defence.
III. For Horse Artillery.

III.

Conclusions.

In the first place it seems desirable to understand clearly what a Q.F. gun, applicable to field service, really is. It may be defined as a gun that can be very rapidly loaded, laid and fired, reloaded, relaid and fired again, and so on, as often as may be necessary. It must, when in action, admit of being readily fired in whatever direction may be required, and should of course possesss the mobility essential to all field artillery. To fulfil these conditions there must be no recoil after firing, or if recoil there be, there must be some mechanical arrangement by which the gun is at once brought back into the firing position. It almost goes without saying, that smokeless powder is a sine-qua-non.

I.

As regards equipment. In comparing the Q.F. gun with that now in the service, it is not proposed to discuss at length the alterations which this somewhat radical change foreshadows; that would be going beyond the scope of this essay. We are not concerned with the best type of quick-firer that can be produced, but have only to point out where the Q.F. gun in general, fails, or excels, when considered for fighting purposes, in relation to our present field armament.

To this end it should suffice, if we confine our discussion to such points of difference as are likely to affect the working of the Q.F. gun in action, and its tactical employment.

To take the working of the gun in action first. This is influenced to a certain extent by the difference in equipment. One of the chief changes lie in the construction of the carriage. In order to absorb the extra strain due to the checking of the recoil, weight is necessary, and yet great strength combined with the requisite amount of lightness to ensure mobility, are conditions that must also be complied with. Hence the difficulty of obtaining a satisfactory Q.F. carriage. Without going into particulars, it may not be out of place to say, that there is hardly a gun factory in England or abroad that has not invented some equipment which is supposed to fulfil the necessary conditions. In perhaps no instance, however, have those conditions been fully attained, at least not in the case of quick-firerers as powerful as the guns with which our present Artillery is armed. Great advances, however, have been made, and gun makers have found it possible to turn out Q.F. field equipments, as light as that of our Horse Artillery, carrying about the same amount of ammunition, and yet armed with as powerful a gun. Possibly more extensive trials than have yet been made, are necessary in order to ascertain the real value of these equipments. Should such trials not prove disappointing it would seem, that so far as the actual carriage itself is concerned, there is no reason why the quick firer should not be adopted in the near future—at any rate for the Horse Artillery—and when still further improvements have been made, possibly for the Field Artillery also. Allusion must be made to the difficulty hitherto experienced with Q.F. field guns of rapidly diverting the fire from one objective to another. This is a very important consideration, for no gun can be considered suitable for field purposes which does not, when in action, admit of being readily pointed in any direction. If the gun is to be fired when limbered up, as has been suggested, this can hardly be done. Even where a "spade" exists, at the end of a trail, some difficulty may be experienced, though possibly not much extra exertion will be needed, unless the spade should be particularly heavy and cumbersome as it certainly appears to be in carriages of the type proposed by "Canet."*

The Q.F. field equipment has also been objected to on the score of want of accuracy in shooting. This undoubtedly was a fault of the earlier equipments, where the "jump" was considerable, but this defect has been to a great extent overcome in some of the carriages more recently made. This was proved in a series of trials which a short time ago took place in South Africa. It was there shown that a battery of Q.F. field guns was capable of firing with great accuracy at a range of 1,250 metres.† Also, in a trial for rapidity and accuracy with a 13-pr. Maxim Nordenfelt Q.F. gun on a field carriage, it was found that 75% of the shrapnel bullets fired, at a range of about 2,200 metres struck the dummies aimed at.‡

The working of the Q.F. gun is also influenced by the difference in ammunition, and this affects the utility of the weapon for service purposes. The metal cartridge case, so well known in connection with quick firers, is open to serious objections, the chief of which, briefly are:—

(1.) Extra weight (our 12-pr. Q.F. case, empty, weighs 5½ lbs.).§

(2.) Liability to damage in limbers and become detached from the projectiles, if these are fixed to them.

(3.) Danger to horses when many empty cases are lying about.

(4.) Necessity for either hand or automatic extractor.

On the other hand, the metal case, containing as it does its own system of obturation, and also the means of igniting the charge, enables a simpler arrangement for closing the breech to be adopted, and at once does away with the use of friction tubes. Also there is no danger of scoring or damage to the vent, for vents and removable vent bushes are no longer needed. But the objections outweigh these advantages. Until quite recently experts have maintained that the metal case is a necessity, and many appear to be still of this opinion. They urge that the system of obturation so successfully used with our field guns is not applicable to quick firers, but trials which have lately taken place rather point to their being mistaken in this. The French claim to have introduced a Q.F. field piece, with which "bare" cartridges are used,‖ and from recent experiments made by us with heavy quick firers, it would seem that the metal case is by no means necessary.¶ The abolition of the case might possibly result in some slight diminution in rapidity of fire, but notwithstanding the value of rapid fire, a small sacrifice in this respect would seem fully compensated for by the advantages otherwise gained. Although rapidity of fire is one of the main essentials aimed at, in considering the action of Artillery in the future, yet mobility is a requisite of equal importance. It follows therefore that the ammunition required should be as light as possible, and yet a powerful, and consequently heavy shell is needed. Thus the abolition of the weighty case is very desirable. Certainly if it can be dispensed with a serious objection to the use of quick firers in the field is at once removed.

---

* "Revue de l'Armée Belge," November, December, 1896, diagram page 132.

† "Revue de l'Armée Belge," May, June, 1897, page 99.

‡ "Revue d'Artillerie." February, 1898, page 459.

§ "Handbook 12-pr. Q.F. gun," 1896, page 12.

‖ "Revue de l'Armée Belge," July, August, 1896, page 93.

¶ "R.U.S. Institution Journal," Nov., 1897, page 1423, Jan. 1898, page 79, Mar. 1898, page 319.

Although therefore the Q.F. equipment is not free from certain disadvantages, these are, in a measure, open to remedy and are likely to be still further lessened when recent improvements have been introduced and perhaps still further perfected.

We have alluded to the necessity of having a plentiful supply of ammunition. The quick-firer will undoubtedly be at a disadvantage if any great increase has to be taken into the field but it is by no means certain that this will be necessary. The matter however must be considered. Later on it will be shown that when the full power of the Q.F. gun is exercised the effort will not be of long duration, and also that in many instances the rate of fire will not be rapid. Moreover our regulations for the supply of ammunition are exceedingly elastic. In cases of urgency they permit any battery in action to obtain ammunition from the wagons of another battery, or from any column that may be within reach whether that column belongs to the unit or not.* Thus deficiency in one quarter may be remedied by borrowing from another. Judging from the past, we find that the Germans in the war of 1870, were at times apprehensive that their ammunition might fail them, but it only did so in a few isolated cases, notably at the battles of Vionville and Gravelotte, and in these instances the failure was due to the ammunition columns not being at hand when they should have been. Also if the batteries had been permitted to borrow from the neighbouring ones they would have been able to continue their fire.†

In considering what supply will in future be needed should Q.F. guns be adopted, it may be instructive to note that with the exception of the battles of Gravelotte and Sedan only three batteries during the whole of the Franco-German war fired more than 100 rounds per gun per diem,‡ and at the above-mentioned battles only 17 and 15 batteries respectively exceeded that number. Also at the battle of Sedan, where a vast amount of ammunition was expended, the 15 batteries of the Artillery of the Guard did not require any assistance at all from their ammunition columns.§ As a matter of fact the Germans had more ammunition than they needed, for in no instance did their mean expenditure exceed 39 per cent. of || what would have been available if the ammunition columns had always been present as they should have been. On the other hand, at Okehampton in 1893 an experiment in rapid and long-continued fire took place, which resulted in a 6-gun battery firing 163 rounds per gun in one day.¶ But this trial was

---

* "Field Artillery Drill," 1896, pages 17 and 21.

† "Revue Militaire de l'Etranger," 1892, pages 151, 152.

‡ Prince Kraft, "Letters on Artillery," page 209.

§ "Revue Militaire de l'Etranger," 1892, page 151.

|| "Revue Militaire de l'Etranger," 1892, page 150.

¶ "School of Gunnery Report (Horse and Field)," 1893, page 51.

favourable to the expenditure of the largest possible amount of ammunition, inasmuch as the battery was in action nearly the whole day and was not impeded by being itself fired at. Thus it would hardly be correct to take this performance as a criterion of what the expenditure in battle is likely to be, although as an approximate guide the results noted are of value. If these results are compared with those already quoted which give the greatest daily expenditure recorded in the Franco-German war, it will be apparent that the improvements introduced in modern armaments have not been followed by an expenditure of such a very much larger quantity of ammunition; and if the present amount allowed is also compared with the results of the Okehampton experiment, it will be seen that our batteries are well supplied. Each Horse Artillery Battery (12-pr. 6 cwt.) carries with it 130 rounds of shrapnel shell and six case shot per gun,* while in the ammunition column it is we believe under consideration to have nearly 100 rounds more per piece. This gives a total of nearly 230 rounds per gun, exclusive of those carried in the ammunition park, which will probably amount to 72 rounds per gun in addition; but these latter cannot of course be depended upon for immediate use, For the 15-pr. B.L. Batteries the supply will no doubt be on the same lines and nearly as great. Making therefore all due allowance for increased expenditure consequent upon the improvements effected in our drill and materiel since 1870, there would still appear, from the Okehampton experiments, to be ample margin left in the scale quoted above for present requirements. Whether that margin is sufficiently great to provide all the ammunition needed should Q.F. guns be adopted, it is difficult to say. Some further increase may be necessary, but we incline to think that in future battles the secret of not running short will lie more in so ordering the ammunition columns that they will, when required, never be far from the units they serve, than in adding wagons to the columns already quite long enough.

One result of introducing Q.F. guns will be that every Battery Commander will have to, more than ever, keep the direction of fire well within his control. The more hurried fire is the more apt is it to become unsteady, that is to say the more likely it is that ammunition will be wasted. Battery Commanders and all under them should realize this, and carefully guard against any useless expenditure.

II.—Tactical Employment of Q.F. Guns.

I. So great is the power of Artillery that superiority in the battlefield cannot be obtained without superiority of Artillery fire. This is now an accepted maxim, but the question arises how is this superiority to be best attained? The most obvious method is that hitherto adopted of bringing as many guns as possible into action from the very earliest phases of the fight. But looking back at the great battles of the Franco-German war, at Gravelotte, Worth, and others besides, we find that batteries were kept out of the fight "simply because there was not enough room to place them also in action." * This is even more strongly brought out in the case of the battle of Sedan, "where 18 batteries could not find room to come into action."† Other examples might be quoted, but these suffice to show that there is a limit to the number of guns that can be brought into a fight, and also that that limit can easily be reached. We seem therefore to have gone as far as we can in this direction. If increased fire effect is to be obtained it must be sought for in another way, and the only other way possible is to make each gun do more than it at present can.

---

* "Equipment Regulations, Part II., 1896 (Horse Artillery Details)," 12-pr. 6 cwt. Equipment, page 36.

There are two means by which this result can be arrived at.

(1). Either the gun must fire a more powerful projectile;

(2). Or else the rapidity of the fire must be increased.

These two alternatives must be considered, because the very existence of the Q.F. gun for field purposes depends upon its superiority over any other system of adding to the fire effect. If a better means to this end can be discovered then the Quick Firer must be at once condemned.

A few years ago a German writer suggested that the most effective method of increasing the efficiency of Field Artillery, was to arm it with a gun capable of firing a heavier projectile.‡ At the time that this proposal was put forward artillerists were endeavouring to discover some means of accelerating the rate of fire. The possibility of adapting Q.F. guns to Field Artillery gave a further impetus in this direction, with the result, that the other alternative met with little encouragement.§ Thus for some years a decided bias in favour of the quick firer prevailed, especially on the Continent, but now there is a tendency rather in the opposite direction and the advocates of a gun capable of firing a somewhat heavier shell are receiving support.|| Fears are entertained that a powerful shrapnel might prove more efficacious than a smaller one more frequently fired, and as the objections to the Q.F. system increase with the calibre of the gun, and consequently with the weight of the shell, it is thought that the quick firer might find itself outclassed by a somewhat more powerful field gun of the present type.

The question now resolves itself into this; is the best quick firer that can be put into the field, superior, or not, to our present field equipment—or to a somewhat similar one—rather more powerful?

It has been shown that if required, a 12-pr. Q.F. gun, with ammunition as effective as that used by our Horse Artillery can be manufactured, even a 13-pr. Q.F. firing a shrapnel, said to contain 300 bullets is reported to have been made.¶ Possibly also a 14-pr. Q.F. could be produced, but as gun makers have hardly yet gone as far as that, it is proposed to take the 12-pr. Q.F. for comparison with the system now in the service. In contrasting these two for fire

---

* "Prince Kraft—" Letters on Artillery," page 34.

† "Prince Kraft—" Letters on Artillery," page 51.

‡ Die Bewegungs erscheinungen der Lang geschosse und deren Beziehungen zu der Eigenschaften der Feld—Geschutze der Zukunft, von Karl B. Bender—Darmstadt."

§ "Revue Militaire de l'Etranger," 1892, page 13.

|| "Journal U.S. Institution," November 1897, page 1393.

¶ "Journal U.S. Institution," Nov. 1897, page 1393.

effect, a comparison of shrapnel fire alone is necessary, for except at "case" ranges these projectiles only will be used.

The supporters of a powerful gun of the present type, hope to obtain a 14-lb. shell containing from 280 to 300 bullets* (our 14-pr., —or 15-pr. as it is called—only contains 200†) but unless the bullets are smaller than ours, and therefore less effective, it seems, expecting somewhat too much to hope for such a shell. Our 12-pr. Horse Artillery shrapnel, contains only 162‡ bullets but these might no doubt be increased to 200 in the 12-pr. Q.F. shell, if the bullets were made as small as the 300 in the 14-pr. shrapnel. The advantage therefore in shell power, rests with the existing type of field gun, and may be taken approximately as 3 to 2. This is a liberal concession in favour of the heavier shrapnel, for it has still to be shown that a 14-pr. shell of that power can be made.

We have now to see where the advantage lies in the matter of rapidity of fire. To ascertain this, the results of actual trials are alone of value.

A trial between a quick firer and a field gun for rapidity of fire is reported in the R.A. Institution Proceedings and the result shews that the quick firer fired at the rate of six rounds of aimed fire a minute, while the field gun only fired at the rate of two rounds per minute.§ But the Q.F. was a light gun, a 6-pr., whereas the field gun was a powerful one, the result being, that the hits on the target, calculated in hits per pound of shell, were the same with both guns. This example is instructive, because it shows clearly, that the Q.F. gun confers no advantages at all, if its calibre is considerably less than that of the gun with which it is compared. A light Q.F. also has all the drawbacks inseparable from the use of weak shells. Another trial with a somewhat similar Q.F. gun, a 6-pr. by Krupp, was made in Germany with very similar results.|| These and other experiments, convinced experts of the necessity of increasing the power of their Q.F. guns, and improvements in manufacture have since enabled much more powerful Q.F. field guns to be made.

One of the most interesting trials with one of these is recorded in the "Revue de l'Armée Belge," June 1897, where a detailed account is given of a trial consisting of several series fired for rapidity of aimed fire. The gun used was 12-pr. Schneider Q.F. on a field carriage, and the results gave an average of very nearly eight rounds of aimed fire a minute. There can be no doubt that the gun was carefully laid, for although the ranges were short the diagrams given represent all the shell as having struck the small target aimed at. A still more remarkable result is quoted in the "Revue d'Artillerie," February 1898. In this instance a 12-pr. Q.F. Maxim-Nordenfelt field gun fired 10 rounds of aimed shrapnel in 59 seconds, with excellent results. Thus, so far as rapidity of fire is concerned, great possibilities may be looked

---

* "Journal U.S. Institution," Nov. 1897, page 1393.

† "Handbook 15-pr. B.L.," page 26.

‡ "Handbook 12-pr. (6 cwt.)," 1896, page 22.

§ "The field gun of the future." R.A. Institution Proceedings, Sept. 1895, page 6.

|| "La Revue Militaire de l'Etranger," 1893, page, 225.

for from the quick firer. It has been shown that a 12-pr. Q.F. admits of quite as rapid a rate of fire as a 6-pr. Q.F., and it seems therefore fair comment to assert that if a heavier type of field Q.F. gun could be produced, say a 14-pr., the rate of fire would be just as rapid. To men of ordinary physique the somewhat heavier ammunition would be as easy to handle as the lighter, and the absence of recoil would be as great a saving of time in one case as in the other.

We may safely assume that any Q.F. gun adopted by us would not be less than a 12-pr., and for Field Artillery probably greater; but whatever its calibre may be, the results of the experiments quoted show that an Artillery thus armed would have the power of developing on the battle-field, should occasion arise, a rate of fire which we may take to be from about six to possibly eight rounds per gun per minute. The value however of this rate of fire depends entirely upon its relation to that obtainable from ordinary field guns. How far the quick firer may excel in this respect can only be ascertained after the performances of the Artillery with which we are at present armed have been considered. If existing guns are as effective no change would be beneficial. Again we must resort to practical experiences for information on this point.

Some years ago the Germans attained, in a trial for rapidity of fire, a rate equal to two rounds per gun per minute,* and the same rate was obtained in 1893 at Okehampton, where a battery fired 12 rounds of shrapnel in a minute.† Also in the same year and at the same practice camp a long continued fire trial took place from a 6-gun battery, with the result that a slightly greater rate of fire was obtained (13·4 rounds shrapnel per minute, fuze set at 2); but even this performance has been eclipsed. Perhaps the most rapid rate of fire that has ever taken place from Field Artillery guns is that recorded in the "General Report on the Practice carried out by the R.A. in India, 1897." It is there stated that "the three best batteries in the Punjaub Command achieved in the magazine fire practice at a target advancing nearly directly at the battery an average rate of 19·4 rounds a minute." This was shrapnel fire. With case shot the rate ‡ was slightly quicker (19·76 rounds per minute). In other words, each battery fired on an average at a rate of rather more than three rounds per gun per minute. But this very exceptional rate of fire cannot be counted on. The Germans hold that 15 rounds per minute is the maximum that can be expected from a 6-gun battery,§ and the results of the practice of most of our batteries point to this as being a very liberal estimate. We may therefore assume that if we take two and a half, or from two and a half to possibly three rounds per minute, as the maximum that can be expected from an equipment that is allowed to recoil, we are conceding to the gun the greatest amount of rapidity of fire it is ever likely to attain. This however falls far short of the effect which we have seen may be looked for from Q.F. guns. Now we have proved that the best field gun which experts hope to get has an advantage over the 12-pr. Q.F., so far as power of shell goes, of three to two, while the advantage in rapidity in favour of the quick firer is at least two to one. Taking therefore the shell power and rapidity together the problem works out to the advantage of the quick firer, and this advantage is considerably increased if we compare the quick firer, not with the best field gun it may be possible to produce, but with our existing armament.

---

* "The Field Gun of the Future," by General Wille, R.A.I. Proceedings, September 1895, page 6.

† "Report on Practice carried out by R.A. in India, 1897," page 27.

‡ "Report on Practice carried out by R.A. in India, 1897," pages 7 and 29.

§ "R.U.S. Institution Journal," January 1898, page 110.

At present it is computed that a battery of six 15-pr. B.L. guns is capable of pouring upon its adversary, a hail of bullets greater than could be produced by the fire of six Maxim guns, each of which can fire 600 rounds a minute.* Double that, and we have a measure of the intensity of fire that it might be possible to obtain from six Q.F. field guns. What therefore must be the effect of the fire of a large number of such guns in a big battle? May we not justly claim that Artillery so armed, will more than ever, play a decisive part in the battles of the future.

In comparing the two systems, the quick-firing and the one at present in the service, we have so far confined our remarks to occasions on which it is assumed, the maximum amount of fire can be developed. To judge however by this alone, would be to place far too high a value upon the results that may at other times be looked for. It must frequently happen that the rate of fire will be no greater than can be obtained from our present armament, where the average rate is somewhat below a round per gun per minute.† When this is the case the Q.F. gun loses its chief advantage, while against its adoption is the drawback of the more complicated equipment, and perhaps also the less powerful shell, to which may be added the possible difficulty of rapidly changing the direction of fire.

Because a gun is capable of being fired rapidly, that is no reason why it should always be so fired. One of the dangers of being able to develop great rapidity of fire is that there will always be a tendency to do so. We must look to careful fire discipline to remedy this fault. The Q.F. gun, in the hands of the Battery Commander, should be treated very much as the magazine rifle is by the Infantry-man who is taught to economise his ammunition, to keep up, as a rule a steady rate of fire, and to reserve very rapid shooting for emergencies, when a decisive effect can be produced in a short space of time.‡ Hence it follows, that there are occasions when, thanks to its power of firing more rapidly, the Q.F. gun may be expected to prove a valuable substitute to our present Artillery, while on the other hand, there must be many instances, when the circumstances of the fight will not admit of the employment of a rate of fire, greater than can now be developed.

We have endeavoured to show the gain due to the employment of a somewhat heavier shell, and also the extent of the advantage to be derived from increased rapidity of fire, but the circumstances under which very rapid shooting is likely to prove effective, have so far received no consideration; yet upon this very point the whole question of the advantage or otherwise of utilizing Q.F. guns now hinges.

---

* "Report on practice carried out by R.A in India." 1897, page 7.

† "Report on practice carried out by R.A. in India," 1897, pages 7 and 14.

‡ "Manual of Rifle and Carbine Exercises,' 1898, page 30.

We have therefore the task before us of ascertaining whether the occasions of which quick firers are likely to be used for very rapid firing, are sufficiently numerous and of sufficient importance to confer on the Q.F. gun any advantage over our present armament.

This point can best be cleared up by following out briefly the normal rôle of Artillery in battle, both when acting on the offensive and defensive, and by noting the instances in which Artillery in the field will benefit by being able to fire more rapidly than it at present can. The result of this inquiry should enable us to determine where the balance of advantage lies.

II. To take the Attack first.—In the initial stages the assailants will generally engage the whole of the enemy's front, so that before they are committed to any definite plan of attack enough may be discovered of the enemy's dispositions to enable the General to decide where it will be most to his advantage to push the attack home. For this purpose rapid fire is not necessary. In the earlier phases of a battle the Q.F. gun will therefore seldom be used as a quick-firer. It would be a mistake at long ranges, where observation at the best is difficult, and where careful laying is necessary, not to fire deliberately otherwise ammunition is sure to be wasted, and this must be carefully guarded against.

By the time most of the Artillery has arrived the General will probably have ascertained enough to enable him to decide upon his mode of attack, but whatever decision he takes his first aim will be to silence the enemy's Artillery.

It is now that one of the most important episodes of the battle will take place: Artillery, pitted against Artillery, will have to fight out the "Artillery duel." All the enemy's guns will fire at the assailants' Artillery, no assistance from other arms can be given, and the struggle must go on until one side or the other by the superiority of its Artillery fire gains the ascendency. Will Q.F. guns be of use in this all-important struggle for supremacy? In the first place batteries will have to ascertain the range, and as the opposing Artilleries will be a considerable distance apart this will need to be carefully done, for accuracy at this period is of the very first importance. The target can have but little depth and therefore any error in finding the range means of firing to no purpose. Moreover any hurry will tend to stand in the way of accuracy. While therefore he is ranging it can matter little to the Battery Commander whether his battery is armed with Q.F. guns or not, but once the range is found the time gained through not having to "run up" might be advantageously utilized to somewhat increase the rate of fire. This rate however must be sufficiently deliberate to ensure great accuracy, and it seems probable that few opportunities will occur during the Artillery duel of effectively employing a more rapid rate of fire than our present armament is capable of developing.

Exceptions to this however may be looked for under certain favourable conditions of ground, light, range, etc.* If batteries are placed on particularly favourable sites, and the range has been accurately found beyond all doubt, it may be feasible to somewhat accelerate the rate of fire; this may also be possible when the Artillery on either one side or the other feels that it is beginning to obtain the better of its adversary, but these are exceptions.

There is one point however in favour of the quick firer that ought not to be overlooked. If both sides are fairly evenly matched, the Artillery duel is likely to last a considerable time. The prolonged fighting of a battery is a great physical strain on the personnel. On active service batteries will have generally to march a long distance before coming into action, detachments will be more or less tired before the fight begins, and as casualties occur, and the guns have to be fought with reduced numbers the work of the gunners will increase, and this, at the very time when they may be called upon to put forward their very utmost efforts. At such a time, anything that can be of assistance, may just suffice to turn the scale. The reduced detachments, wearied with continually running up the guns on perhaps heavy ground, cannot be as fit for work as their adversaries, armed with the quick firer, and who throughout the fight have been spared this labour. Nothing tells more against accurate practice than physical exhaustion. When the detachments become fatigued, the guns must of necessity be less carefully laid, and the shooting will in consequence be less accurate. Even in peace time, with full detachments, the labour of working the guns is found to be very heavy. This fact was especially brought to notice quite recently by the Camp Commandant, Okehampton. In his report for 1897 on the practice of the Horse and Field Artillery batteries under his command, he states:—†

"It is very noticeable at practice, even with full detachments, that the physique of gunners of Field Batteries is not equal to the work required in the service of the gun."

It would seem therefore that the adoption of the Q.F. gun would sensibly increase the efficiency of our detachments at a time we require to have them at their very best. There can be no doubt that the saving in labour when batteries are long in action would be very great. Anything that tends to thus lighten the work of the gunners must commend itself to us as well worthy of consideration.

Also, besides sparing the detachment, the non-recoil carriage confers another advantage. It enables a position to be taken up, which could not so well be occupied if the carriage were permitted to run back. The well-known position selected by the Germans on the Rotherberg, at the battle of Spicheren is an example of this kind. This position was exceedingly narrow, and the space available for recoil limited.

But to return to the attack:

If the Artillery duel has ended in favour of the assailants the Infantry will advance, and as they do so the Artillery will have to support them. It seems unnecessary to go into particulars as to how this can best be done. Local circumstances must decide whether batteries should advance or not. In any case the batteries will in a measure be relieved from the fire of the defenders' guns, which will at this stage be directed against the advancing Infantry.

---

* "L'Artillerie pendant le Combat," Revue d'Artillerie, December 1897, page 262.

† "Annual Report of School of Gunnery (Horse and Field)," 1897, par. 47.

This will be the moment for vigorous action. Freed to a certain extent from the enemy's fire, the Artillery should utilize its utmost strength in supporting the advancing Infantry, which at this period will certainly suffer most. For this purpose quick firers may prove more serviceable than the guns with which our batteries are now armed. The need for great accuracy which obtained in the earlier phases of the fight is less at this time, when the defenders' Infantry will be engaged and when the target may be expected to have greater depth. Also the ranges being probably shorter accurate laying will be easier and more rapid. As the Infantry advances therefore the rapidity of the fire of the supporting Artillery should increase, and when the Infantry is about to deliver its final attack the most rapid fire possible consistent with fairly accurate shooting should be directed on the points of assault. It should be the aim of the assailants to overwhelm their adversary with the most powerful fire it is possible to produce. A veritable storm of bullets should be directed against him, and for this purpose the quick firer seems eminently well suited. Its judicious employment may just turn the scale, for it is just at this critical period, when the troops are well nigh overcome by hard fighting, that the timely support of an Artillery, developing perhaps for the first time the full power at its command, may give to the exhausted Infantry just sufficient support to enable them to push on and capture the position for which they had so hardly fought.

But even if the assistance thus given should prove of no avail the quick firers could do good work in covering the retreat. Any counter attack on the part of the defenders would bring their troops under close range of the assailants' guns. The quick firer would then be in its element; great accuracy in laying would not be needed, indeed it would be quite out of place, for the object of the Artillery will be to cover the somewhat extended zone across which the defenders are advancing with as rapid and destructive a fire as it is possible to develope. In a very short time it must be decided whether the counter attack can be pushed home or not, and during this brief period those guns which are still able to continue firing must do so to the utmost of their power.

Supposing however, that no counter attack takes place, and that the position is captured. The Artillery will still have important work before it. It is one thing to take a position, another to keep it. The Artillery must help to keep it, and for this purpose it will advance as soon as possible right into the position itself and will open fire at decisive ranges, regardless of risks, which may be freely incurred.* Here again favourable opportunities may be found for the employment of rapid fire. No rule can be laid down, the action of the Artillery must depend upon local conditions, it may, even after the position has been captured, have to repel a counter attack, or it may be engaged altogether in pursuing with its fire, the retreating enemy. In any case it will be the aim of the Artillery to produce a maximum of effect, in the shortest possible space of time, and as the fighting will be at fairly close quarters, and the target an easy one, great rapidity of fire is permissible.

---

* "Field Artillery Drill," 1896, page 32.

In considering the use that can be made of Q.F. guns in the attack, we have, for the sake of brevity, confined our remarks to the normal conditions under which, in civilized warfare, an attack is likely to take place. Variations from this may occur at almost any period of the fight, but space does not admit of their being considered in detail. The experience of war however shows, that favourable opportunities for the employment of Q.F. guns, may present themselves at almost any time, in fact whenever a sudden exhibition of the full power of the arm is needed.

If the relative merits of the Q.F. and service systems be considered in the defence, it will be found that much that has been said in regard to the attack, finds its counterpart in the defence, although, in some respects, in this latter case, greater possibilities for the useful employment of Q.F. guns may be looked for. There should for instance be no anxiety about ammunition, a plentiful supply of which ought always to be with the guns. Also the ranges to all positions the attackers might take up, being known, rapid shooting can be more readily resorted to. But notwithstanding these advantages it does not seem that the defenders will, in the first phases of the battle, profit materially by the employment of Q.F. guns. Their main object will be to delay the advance by compelling the enemy to deploy his forces. Deliberate, accurate shooting at long ranges, will best bring about this result. Of course opportunities may occur of falling on attacking batteries as they come into action. Every advantage should be taken of any such chances, and if the range is known, rapid fire may be very usefully employed, but such opportunities will be the exception. As a rule rapid fire will seldom be possible. Accuracy at this period is an all important consideration and great rapidity of fire cannot be combined with it when the ranges are "distant." During the Artillery duel also, it is not likely that the employment of Q.F. guns will confer any advantage, beyond that of labour saved through not having to run the guns up. What has been said of the attack at this period, applies therefore equally to the defence.

It is not till the advance of the attacking Infantry takes place that the Q.F. guns of the defence will be called upon to exert to the utmost their power. A target broad in front and considerable in depth, will then be presented to the defenders' fire. Against such an objective great care in laying would be a waste of time. It is of paramount importance to stop at any cost the advance of the lines upon lines of attacking Infantry. Also being themselves at this time subject to a heavy fire, it is of advantage to the defenders that their Artillery should do its work as rapidly as possible, for the longer the guns remain in action under the very heavy fire to which they will be exposed the greater the prospect of their being overwhelmed. The defenders' fire should therefore be as rapid and well sustained as circumstances permit. For this purpose the quick firer is admirably adapted. It may well happen that the additional strength thus given may, in a hardly-fought contest, save the defenders from defeat, for be it remembered, some of the greatest victories that history can name have narrowly escaped being great disasters.

If the assailants are repulsed the defenders in their turn will become assailants, and in the counter attack they make opportunities will not be wanting in which rapid fire can be advantageously employed. Thus, in the defence as in the attack, the quick firer confers little advantage during the opening scenes of the battle. Its employment as a rapid firer is restricted to the period when the hostile forces are within medium or decisive range of each other; but whatever opinion may be held as to the actual rate of fire that will be possible at the various stages of the struggle, it must be conceded that the balance of efficiency will, at these critical periods, when very rapid shooting may be freely resorted to, lie with the Artillery capable of firing with the greatest rapidity.

We have not mentioned all the circumstances under which Q.F. guns can be employed, neither does the space at our disposal admit of our doing so in detail. Artillery may be sent with rear guards, advance guards, or on outpost duty, and although the facilities for the effective use of quick firers on these occasions will be restricted, opportunities may present themselves for their employment with very great advantage. The Artillery Commander should bear in mind, that the sphere of the quick firers' utility is, as a rule, limited to occasions, when the range is close, when a considerable effect can be produced in a short space of time, and when the target is an easy one. In such cases only is great rapidity of fire allowable. The circumstances under which our army fights are so different to those under which Continenal nations do so, that we must without hesitation modify the conclusion arrived at, wherever the conditions under which we are fighting render it desirable to do so. It is our lot, often to engage in warfare with savage nations, and with those only partially civilized. In such fighting, the tactics suitable to civilised warfare are not necessarily the best that can be employed. It must depend upon the nature of the country we are operating in, and the enemy's method of fighting, whether Q.F. guns are likely to be of great use or not. Generally, savages attack in large numbers and come to fairly close quarters, and so frequently against them Q.F. guns should prove very effective.

As Q.F. guns have been considered for Mountain Artillery, a word concerning their use for this purpose seems desirable. It is very doubtful if they would confer any advantage at all. The so-called Q.F. mountain guns already brought out, are not really quick firers, inasmuch as they recoil. If that recoil is altogether checked they are apt to turn over.* Thus they are not quick firers, though they may be quick loaders. Under normal conditions they cannot fire more than three rounds per minute,* but they have this advantage, that for their size they are wonderfully powerful. (Krupp and the Maxim Nordenfelt Co. have both a *12½-pr.* mountain gun.) Such guns therefore are to be recommended, for their power, but not on any other account.

---

* "Revue d'artillerie," January, 1898, page 356, 357.

III. Before closing this discussion mention must be made of one further use for the quick firer. Although taken last it is possibly the most important of all. We refer to its employment as a Horse Artillery gun. Provided the equipment admits of fire at once being turned on a new objective, and with Horse Artillery this is of especial importance, the Q.F. will in no capacity have greater opportunities of fulfilling its rôle. The very qualities demanded from the Horse Artillery are just those in which the Q.F. gun excels. The value of Horse Artillery depends upon its mobility and upon its rapidity of action. To obtain these some sacrifice in shell power is allowable. Therefore a gun firing lighter ammunition than is needed for Field Artillery will suffice, and such a quick firer it has been shown, already exists. At no stage of the fight therefore will the fire from the Horse Artillery Q.F. be less powerful than that of the Horse Artillery gun now in the service. It has also been shown that when the two systems are contrasted, calibre for calibre—the shell in each case being of the same weight—the advantage unquestionably rests with the quick firer. Therefore this gun is especially well adapted to the requirements of Horse Artillery.

To particularize the advantages which the Horse Artillery quick firer may be expected to exhibit, it must be considered under the double aspect of its employment—

(1). With the Corps Artillery.
(2). With the Cavalry Division.

If employed with the Corps Artillery its duties are very much those of Field Artillery, for although it still maintains its advantage of increased mobility, which may enable it to reach the battle-field sooner than the field batteries, yet the conduct of the fight will necessitate its conforming in a great measure to the procedure of the Field Artillery. What has been said as regards quick firing Field Artillery in battle, applies therefore equally to Horse Artillery Q.F. batteries belonging to the Corps Artillery. The same may also be said of the Horse Artillery of a Cavalry Division armed with quick firers, whenever it is not actually with the Cavalry, for when not so employed the experience of the past shows that it can best be utilized in the Artillery duel and subsequent stages of the fight.* But it is when Horse Artillery is acting with Cavalry that the advantages of the quick firer will stand out most prominently.

It is an old maxim that the success of Cavalry depends upon its action being sudden, rapid, and opportune. These conditions apply equally to Horse Artillery acting with Cavalry. The mobility of the arm and the initiative of the commander provide for the first and third, while rapidity of fire is best ensured by employing Q.F. guns, which, from the conditions under which Cavalry fight, will be able to come into action at fairly close ranges, and may therefore be expected to fire not only with great rapidity but also with great effect. Should the attack prove successful the quick firer is well adapted to pursue with its fire the retreating enemy. If, on the other hand, the hostile Cavalry gains the advantage the Horse Artillery will have before it the exceedingly difficult but most important task of covering the retreat of the Cavalry. In this episode of the fight every moment will be of value. Unassisted, the Artillery will be called upon to check the advance of a victorious enemy. Only a very short space of time will be available, and in that limited period a very great deal will have to be done. Close ranges and an easy target will be in favour of the Artillery, but in order to fully profit by the situation it must be able to develope an exceedingly rapid fire. There can be no doubt that for this purpose no gun that has yet been invented can compare with the quick firer.

---

* Prince Kraft, "Letters on Artillery," page 293.

III.—Conclusion.

We have now to summarise the advantages and disadvantages of Q.F. guns when employed in the field, and to decide whether their adoption will, on the whole, be productive of any advantage or not.

From a tactical point of view the object sought for is, increased fire effect on the battle field. If the Q.F. is the best means to this end, then its adoption is desirable. Undoubtedly it supplies this want to a certain extent, but so also does the more powerful field gun, advocated by opponents of the Q.F. system. At present the Q.F. labours under the great disadvantage of being unable to fire a shell as powerful as could be desired. This seems to be its most serious drawback, while the gain in rapidity of fire and saving in labour to the detachments due to the absence of recoil, constitute its chief recommendation. Thus, in a great measure, *power* has to be weighed in the balance against *rapidity*. It has to be considered how far the former can be sacrificed in order to obtain the latter.

The problem thus becomes a question of degree, depending upon the amount of power lost and the extent to which that loss is compensated for by the increased rapidity of fire obtained. Also the frequency with which rapid fire can be employed must be considered.

We have seen that the more powerful gun confers advantages at every stage of the battle; *whenever ordinary rates of fire are employed.* On the other hand, the quick firer, enables a far greater effect to be produced, *whenever the full power of the gun can be developed,* but not at other times. It has also been shown that in the earlier phases of a battle the Q.F. possesses little or no advantage, save that due to the absence of recoil, and that it is not till later, that its superiority asserts itself. Thus rapid fire will be most effective at those critical periods when success or failure hangs in the balance, but then again, to arrive at these decisive moments the Artillery must previously have been able to hold its own, and until a more powerful field Q.F. than at present exists can be adopted, it seems very doubtful whether it will be able to do so. The inference therefore is, that the quick firer confers no material advantage when employed in civilised warfare, *unless its shrapnel approximates in weight to that of the field* *gun that would otherwise be used.* Should it be found impracticable to obtain such a Q.F. for the Field Artillery, it may be, that some compromise can be effected, which will admit of an equipment, partaking largely of the nature of the Q.F. and yet not quite fufilling all its requirements, being adopted. Thus, the nearer we can get to a Q.F. equipment, the more effective will our Artillery be. If however, a sufficiently powerful Q.F. can be produced, it will undoubtedly give absolute superiority.

For the Horse Artillery we can almost claim that this advantage is already ours, inasmuch as Q.F. pieces of the requisite power exist. It may perhaps be a little premature to assert that these possess all the qualifications needed, but that they fulfil them in a large measure, may be gathered from the fact that the French have, at the present time, 130—12-pr. Q.F. batteries, and the Germans a considerable number.* Rumour has it that the German batteries have not proved altogether as great a success as was anticipated,† but it must be remembered, that the question of Q.F. guns for field service is still almost in its infancy, and that modifications in equipments may be looked for, which will no doubt lessen, if they do not entirely remove, any existing defects. The result of such improvements would be, that a Horse Artillery thus armed, will most certainly be able, under all circumstances, to compete, on at least equal terms with any existing Horse Artillery gun, while, whenever very rapid fire is required, it will be greatly superior.

Consequently we may conclude that Q.F. guns are particularly well suited to the requirements of Horse Artillery, and also that their adoption for the Field Artillery will undoubtedly prove of the greatest value, if it is found practicable to extend the quick-firing system to field guns as powerful as may be needed.

---

* Parliamentary debate, *Times*, March 1st, 1898.
† "Naval and Military Record," January 27th, 1898.

THE ADVANTAGES AND DISADVANTAGES OF Q.F. GUNS FOR ARTILLERY IN THE FIELD.

BY

CAPTAIN R. A. K. MONTGOMERY, ROYAL ARTILLERY.

"A FRIEND IN NEED IS A FRIEND INDEED."

COMMENDED ESSAY, 1898.

N.B.—To save repetition the present gun is spoken of as a "Field Gun," the Q.F. Field Gun as a "Quick Firer" or "Q.F."

Introduction.

"In proportion as the importance of fire-arms has increased, and their ascendancy in the field of battle become established, so also step by step has the influence of Artillery advanced; comparatively a recent invention, only dating as it does from the introduction of firearms, it has constantly gained increased independence, and every step in advance which has been made by the latter, has been followed by a corresponding improvement in the Artillery."

So wrote Von Schell in 1877 and the truth of his statement is just at present receiving ample confirmation; the breech-loading rifle of 1866 was shortly followed by the general introduction of breech-loading field Artillery, and, twenty years later, the adoption of a magazine rifle appeared to be the signal for a further change in the armament of the Artillery.

At the time when the subject for this essay was issued, it was felt that the change was only a question of time; no nation cared to be the first to take the important step, partly from not wishing to incur the enormous expense of re-arming, unless it was absolutely necessary, and partly from a desire to obtain the best weapon possible before deciding on the change. France was generally supposed to be taking the lead, and a sketch and the description of a Q.F. Field Gun appeared in the *Graphic* of 23rd January, 1897. It was the invention of M. Canet, manager of the Artillery Section of the Société des Forges et Chantiers de la Méditerranie, and the letterpress opened with the remark "It is a moot point whether France or Germany will first undertake the re-arming of her forces." This uncertainty continued for some little time and the general impression appeared to be that Germany was not doing more than experimenting, but, on the assembly of the Reichstag, it was found that this idea was altogether erroneous and the War Minister asked for a vote, not to provide quick-firing guns for the Field Artillery, but to pay for guns, many of which had been provided and were ready for issue to batteries.

With Germany thus armed it is safe to prophecy that the other Great Powers will soon feel themselves compelled to follow suit, and it would seem to be a most suitable time for us to consider what we should hope to gain by the introduction of the new weapon, and what would be the most probable drawbacks.

Before, however, attempting to discuss the main question, let us be quite sure that we thoroughly understand what a Q.F. field gun is likely to be. It must of necessity vary considerably from the Q.F. gun mounted in a work or on board ship, but, as the target will also be very different, it is easy to imagine that the Q.F. field gun may be as efficient in the field as the Q.F. garrison or ship gun is on its more permanent mounting. At first sight the following extract from the School of Gunnery Report for 1897, appears fatal to any Q.F. field gun, it reads, "The 3-pr. Q.F.'s were severely handicapped by being on travelling carriages, a mounting which is quite unsuited for a Q.F. gun with a fast target;" but it is quite evident that the "fast target" is the difficulty, and there is no reason to suppose, because a gun on a certain mounting cannot successfully engage a torpedo boat travelling at 20 knots, that it cannot do excellent work against a target moving at less than half that pace and often stationary.

The chief difference between the Q.F. in the field and those which we are accustomed to see on permanent mountings must arise from the difficulty of getting rid of the jump of the gun. Recoil can be overcome comparatively easily by various combinations of brakes, buffers, and some form of trail anchorage; but to overcome jump is a far harder matter, because the more the recoil is checked the greater is the tendency for the gun to revolve round the point at which the recoil is checked. That it has been found possible to eliminate this jump with the ordinary field gun has been proved by our 15-pr. on the Mark II. carriage, but if the recoil is to be still further checked by anchoring the trail, on the principle of the Canet gun, it would seem that jump must re-appear.

The very permanency of the ship or fort mounting almost entirely prevents this, and the recoil can be checked to any extent consistent with the strength of the materials used.

Assuming that all difficulties of manufacture have been surmounted, it will be necessary now to consider what are likely to be the advantages and disadvantages consequent on an adoption of Q.F. guns for Artillery in the field.

Part I.—
Advantages.

PART I.

ADVANTAGES TO BE GAINED BY THE INTRODUCTION OF Q.F. FIELD GUNS.

We may discuss these under the following headings:—

1. Increased rapidity of fire.
2. Absence of recoil.
3. Mechanical firing.
4. A possible reduction in the strength of detachments.

1. Increased rapidity of fire.—The very name, "Quick Firer," points to this as being the chief advantage to be gained, and any others that there may be are more or less incidental to this main object, and due to details of design and manufacture rendered necessary in order to obtain this result.

1. Increased rapidity of fire.

Rapidity of fire, combined with accuracy, is rightly looked upon as the test of a well-trained battery, not on the principle of 20 years ago, that the smartest battery was the one that could "get the first round off" after coming into action, but because it is felt that a battery which can fire rapidly and accurately must be so thoroughly imbued with a spirit of fire discipline that no excitement or unforeseen circumstances could disorganize the system. If then, by some mechanical means, the rate of fire can be still further increased without unduly straining the detachments, it would appear that there must be a distinct advantage, provided always that accuracy is not sacrificed to a desire to "break the record" in the matter of rapidity, and that the fire tactics are such that the rate of fire is always suited to the particular circumstances of the moment.

As in most military questions, there are two distinct heads under which the advantages to be gained by the increased rapidity of fire may be considered, they are :—

(a) The moral effect.
(b) The physical effect.

(a) The moral effect.—Napoleon laid down that in war the moral was to the physical as three to one, and it is certainly from this moral effect that one must look for much of the advantage to be gained by the power of being able, at a moment's notice, to direct a hail of shell upon a particular object.

The moral effect of such a fire, when once the range has been even approximately found, should be so great as to shatter the adversaries' nerves, and make it impossible for them, if Artillery, to obtain the range or carry on anything like a steady fire. Against attacking Infantry the effect should be to make it impossible for them to pass across the fire-swept ground until the guns have been silenced ; and against those on the defensive the necessity of remaining under cover should prevent them making any adequate attempt to meet an advancing enemy.

This all points to the enormous advantage to be gained by being in action before the hostile Artillery, and should materially assist the batteries of the defence, whose duty it is to ascertain beforehand the ranges of all conspicuous points in the enemy's line of advance and crush his batteries in detail as they attempt to come into action.

It may be said, then, that the moral effect of this increased rate of fire will be to protect, to a greater extent than at present, the guns which first obtain the range, by causing the adversary's fire to be inaccurate and irregular.

(b) The physical effect.—The drill book lays down that the defeat of the enemy, and not protection from his fire, must be the primary object of Artillery in action, and that this can best be obtained :—

(1) When engaged with Artillery, by concentrating an overwhelming fire on successive portions of the line of guns.

(2) When supporting an Infantry attack, by concentrating the fire of all (or a large portion of) the guns on the part of the enemy's line which has been indicated as the point of attack, and

(3.) When attacked by Infantry, by distributing fire over the whole front of the attackers, or over every part of the enemy's attack formation.

In each of these cases, assuming the laying equally good, a battery which, after finding the range, can fire 30 aimed rounds per minute (a rate which is below that claimed for some quick firers) and keep up that fire whilst the emergency exists, must have an enormous advantage over a battery which, magazine and salvo fire excepted, can only maintain a rate of some 7 rounds a minute ; and the physical effect, or amount of material damage caused, must be approximately proportional to the number of extra rounds fired in the given time.

This advantage is further accentuated by the fact that on the battle field, opportunities are often fleeting, and whilst they last the field gun may be able to fire so few rounds that the percentage of hits, even with good shooting, can do little, whereas the extra number of rounds from the quick firer may cause an enormous amount of damage ; for instance, when firing at Artillery coming into action, or moving along a road past a gap of which the range has been ascertained beforehand ; or when Horse Artillery is acting with Cavalry against Cavalry, during the few moments immediately preceding the charge. But, in addition to these ordinary phases of the battle, there are many occasions in war when the extra power of rapid fire might be of the greatest advantage ; for instance, in the defence of a bridge or other defile, where it is frequently only possible to put two guns in action on the road. With quick firers this section would have as great a stopping effect as a whole battery of field guns, and it would seem impossible that a defile so protected could be rushed.

Again, with advance and rear guards, where the object is to use as few troops as possible, the quick firer will be a distinct acquisition, not because it would, when so employed, always have to fire rapidly, but because it would be able to do so if required.

Advance guards at times have opportunities of surprising the enemy, as at Beaumont and Mars La Tour in 1870, and the moral effect of such a surprise would be greatly enhanced by rapid and accurate fire from the Artillery.

With rear guards the difficulty is that one must employ sufficient troops to force the enemy to deploy to turn them out of each position taken up, but, the more troops employed the harder it is to withdraw them ; and as the fire of a battery of quick firers could, on an emergency be as heavy as that of a brigade division of field guns, added to which it would occupy less ground and could be more easily withdrawn, it would appear that such a battery would in this case greatly simplify matters.

Again, when closely supporting an Infantry assault, which is always liable to be suddenly checked and thrown into confusion by a skilful counter attack, the rapid fire of quick firers would be most valuable to break up such attack, and also to prevent a recurrence of it after the position has been captured. In the latter case it would probably be only stray batteries of the attack which could at first come into action and the increased power of their fire would materially assist the Infantry in holding their ground, and make it very difficult for the enemy to attempt any counter attack in force.

And lastly, it has for many years been the boast of gunners that Artillery can defend its own front, and this it has seldom failed to do in recent years, if we except Balaclava, the German Cavalry charge near Flavighy, and our own Cavalry charge at Kassassin; but, if there is any doubt about this, it should no longer exist with quick-firing Field Artillery, when we consider that such a battery could pour over 100 shell into Cavalry during the last 500 yards of the charge, and this without any change of drill or confusion due to guns running back upon the limbers.

The above remarks are based on the following data, viz., that quick firers can fire at least five aimed or 15 unaimed shots per minute (these numbers being well within the estimates of inventors), and that there is no lack of ammunition, the difficulties as to the supply of this being considered later. Also that "Battery fire at 10 seconds" is a fair estimate of the rate of fire of the present field guns under ordinary circumstances, and that magazine fire with these guns is only intended to be used for "meeting a Cavalry attack at close range."

2. Absence of recoil.

2. Absence of recoil.—The advantages to be derived from a total absence of recoil may best be considered under the four heads:—

(a) Saving of time.
(b) Saving of labour.
(c) Less level ground necessary.
(d) The possibility of using unaimed fire.

(a) Saving of time.—That time is lost owing to having to run up guns in action, time which would not be taken up by any of the necessary operations of supplying ammunition and loading, is amply proved by the paragraph in the drill book relating to magazine fire, which says that "as rapidity is of supreme importance . . . the guns are not run up unless it is necessary to do so."

(b) Saving of labour.—Nothing is so tiring for the detachments as the continual running up of the guns. Even on hard ground it is irksome, but on sand or soft ground it soon becomes fatiguing, and materially lessens the fighting power of the men, and affects what Captain Herbert, in his "Psychology of the Battle Field," calls the vitality or power of the body to resist the forces of destruction.

An example of this on service may be found in the action at Mahuta, in 1882, when Hickman's Division of N/A was in action from about 7.30 a.m. to 6 p.m.; the ground was fairly firm sand, but the labour of "running up" was so great that the drivers had to assist in reliefs.

Again, at Waterloo it is related that the gunners were so tired out towards the end of the battle that it was impossible to run the guns up, and finally guns and limbers all got mixed up together.

(c) Less level ground necessary.—This may be a matter of considerable importance in selecting positions for guns, as frequently with field guns it is impossible to occupy ground which presents great advantages both of view and cover because of a slope in rear down which the guns would recoil. In the same way the inability to occupy the line immediately above the reverse slope of a hill frequently necessitates occupying a more forward position, thereby exposing the guns more to view with no compensating advantages.

(d) The possibility of using unaimed fire.—With a gun that recoils, unaimed fire must be out of the question; the gun frequently recoils in a slightly oblique direction, due to some irregularity of the ground, and, as it would only be on the greatest emergency, when no attempt could be made to run up, that there would be any real necessity to use such fire, not only would it be useless, it would be positively dangerous to neighbouring guns and other troops. Do away with recoil, however, and unaimed fire may be quite accurate enough for short ranges, and the increased rate of fire on emergency may be invaluable. In proof of this the following extract from experiments carried out with the Canet field quick firer is of interest; the writer, from the context, evidently using the word "training" in the sense of "laying"; he says: "Ten shots were fired successively without any rectification being made in the training, and the target was struck 10 times, the points of impact being so close as to be almost identical."

The target fired at was about six feet wide by nine feet high and the range 120 yards.

3. Mechanical firing.

3. Mechanical firing.—Although it is not absolutely necessary that the charge for a quick firer should be contained in a metal case, still it is most probable that it would be, if only for the time that would be saved by the cartridge being able to contain its own means of ignition, and thus do away with friction tubes and the irritation and delay which so frequently attend their use.

Missfires would then be due to some error of manufacture and not, as is usually the case now, to excitement on the part of the firing number; also there would be fewer stores to be thought of, and in the event of the firing number being disabled any other man could at once take his place without having to provide himself with special stores, such as lanyard, tubes, etc.

And lastly, and this is a thing which not infrequently occurs, there would be no fear of having to interrupt the fire owing to being short of tubes at any particular gun, as the number of rounds available would be the number of cartridges in hand, without reference to any small stores.

That the above are matters of importance may be gathered from the following remarks of the Commandant at Okehampton on the practice of a battery there last year:—"The firing numbers constantly jerked the lanyards." "Two missfires in succession in No. 3 owing to bad jerking." "Tubes exhausted in No. 1; gun remained out of action." "No. 1 of No. 1 gun himself ran to get spare tubes from the wagons."

4. A possible reduction in strength of detachments.

4. A possible reduction in the strength of detachments.—The great advantage gained by not having to run up the gun after firing has already been considered with reference to the saving of time and labour, but it has not been considered with reference to the number of men employed over the work. Three men are necessary to run up a field gun, so that, if this operation can be dispensed with, there will be considerably less for these numbers to do each time the gun is loaded and fired. Again, with the trail anchored, there will be no necessity for a number to attend to it in laying for direction, this having of necessity to be arranged for by the gun being carried in a cradle with a certain amount of lateral play to be worked by the gun layer.

Taking these points into consideration it might be possible to assimulate the drill of the Q.F. field gun to that of the Q.F. gun on a permanent mounting by telling off one number to load, another to attend to the breech, and a third to lay and fire, or else to let the number who attends to the breech also fire; either of these arrangements would save one man in each detachment, but would have the disadvantage of giving the No. 1. a great deal of work, and, when rapid firing was going on, would make it very difficult for him to look after his detachment. Whether or not it would be advisable to so weaken the detachments, having regard to the increased labour in bringing up ammunition, and the heavy work of shifting an anchored trail in order to change on to a fresh objective, is doubtful, but there would certainly be this advantage that, when casualties occurred, the quick firer could be more efficiently served with reduced numbers than can the field gun.

The above would appear to be the principal advantages to be hoped for from the introduction of a Q.F. field gun ; but "there is no rose without a thorn," and it is necessary now to consider the disadvantages which must be expected and as far as possible counteracted, should the change take place.

PART II.

THE DISADVANTAGES OF Q.F. GUNS FOR ARTILLERY IN THE FIELD.

Part II.—The Disadvantages.

No radical change of any description, military or other, can be suggested without there being found many, if not at first a majority, who think that the advantages of the proposed change are more than counterbalanced by the unavoidable accompanying disadvantages.

It is not, then, surprising to find that there are serious disadvantages which present themselves as soon as the altered conditions of Field Artillery armed with a quick-firing gun are considered ; but, if these disadvantages can be smoothed away by changes of organization, without either unduly hampering the other arms or detracting from the advantages claimed for the gun, then, if these advantages are worth having, it would appear that the question of its adoption depends upon a consideration of pounds, shillings and pence, altogether outside the military problem.

What then are these disadvantages ?

They may be said to be roughly those of Cause and Effect ; the former due to necessary alterations in the mechanism and construction of the gun and carriage, and the latter resulting from the increased rate of fire which it will be possible to obtain from the gun under its altered conditions.

These disadvantages may be discussed under the three headings :—

1. The gun and carriage will be more complicated, more likely to get out of order, and probably shorter lived.
2. The difficulties of ammunition supply will be greatly increased.
3. The ammunition will be heavier (for the same shell power), more expensive, and more difficult to make up.

1. Greater complication of gun and carriage

1. The gun and carriage will be more complicated, more likely to get out of order, and shorter lived.—In selecting a field gun there are two main points to be kept in view ; first, the total weight of the equipment must be kept within the recognized limits of what six horses can draw at the necessary manœuvring pace, and secondly, the gun must be capable of firing as heavy a projectile as possible.

When first the question of introducing a quick firer for Artillery in the field was raised, it was feared that, in order to get rid of all recoil, it would be necessary to sacrifice either the power of the gun, by making it fire a lighter projectile, or else its mobility ; but recent inventions on the Continent have shown that these misgivings were groundless. To obtain the necessary results, however, there must be very powerful additions to the already existing methods for checking recoil, and consequently, if the total weight of the equipment is not to be increased, the carriage itself must be made of lighter construction.

There are at present two recognized methods of checking the recoil of a field gun, the first by means of a buffer attached to the gun and carriage, the second by means of brakes acting on the wheels of the carriage.

These systems may of course be used in combination, as in our 15-pr., Mark II. carriage, but something more is wanted to get rid of the whole recoil, and this would appear to be some form of trail anchorage, which would bury itself in the ground either when the trail is dropped or on the first round being fired.

Now it may be said that these various appliances are in use on existing carriages, and apparently without any disadvantage which ordinary care cannot overcome ; but it must be remembered that the present gun is not altogether prevented from recoiling, and it would seem that if it is to be, then the strains on the carriage must be greatly increased ; and the question is whether the carriage will be strong enough to resist these strains for any length of time without being made heavier, and this is impossible without affecting the mobility of the gun. Again, each additional appliance, whether it be a spring, a buffer, or a brake, must require extra care and add to the chance of a breakdown.

2. Increased difficulties of ammunition supply.

2. The difficulties of ammunition supply will be greatly increased.—Great as the advantages of being able to fire rapidly may be, there is no use in trying to conceal from ourselves the difficulties in the way of the extra supplies of ammunition that may be required. To see what these may amount to, it will be necessary to examine a few details as to the possible expenditure.

First, take the field gun "Battery fire at 10 seconds," the wagon ammunition will last $1\frac{3}{4}$ hours, the gun limber ammunition $\frac{3}{4}$ hour ; or in other words the battery without assistance, and if not obliged to increase its rate of fire for any reason, can remain in action for $2\frac{1}{2}$ hours.

During the battle it can count on receiving fresh supplies from the divisional ammunition column, and these if evenly distributed between the various batteries will last another hour, and consequently the battery can expect during the day to be able to keep up the rate of fire we are considering for $3\frac{1}{2}$ hours.

These times are of necessity merely theoretical, as it is impossible to form any idea as to the periods during which "subdivision" or "magazine" fire might have to be employed.

Now, suppose the quick firer, with the same amount of ammunition as the field gun, but firing at the rate of 5 rounds per minute ; the wagon ammunition will last 18 minutes, the gun limber ammunition 7 minutes, and consequently the battery can remain in action without assistance for only 25 minutes. The ammunition column will only provide for another 9 minutes, so that the whole of the ammunition available for the day can be fired away in 34 minutes.

It is not suggested for a moment that a quick-firing battery on coming into action would proceed to fire away all its ammunition as quickly as possible after the range had been found, nor is there any reason to suppose that, except when occasion demands it, the ordinary rate of fire of quick firers will be greatly in excess of that of well served field guns ; but, the point desired to be made is this, that if a rapid fire becomes necessary for any reason, the present supply of ammunition carried by the battery will be quite inadequate, and that unless it is increased the ammunition column must be prepared to render assistance almost from the commencement of the fight.

At what period in the battle the strain may come is uncertain, but it is quite certain that batteries may be called upon to sustain a rapid fire for a very considerable time, far longer than is possible with their present supply.

Take for example the Prussian Guard Artillery during the attack on St. Privat; for more than half an hour the Infantry attempted in vain to reach that village, and during the whole of that time, and before the actual advance, the greatest possible support was required from the guns: Prince Kraft speaks of it as "the continued necessity for a rapid fire," and tells us that on this day the 15 batteries of the guard fired between 8000 and 9000 shells, an average of about 100 rounds per gun, and practically all they carried. How much of this ammunition was expended whilst preparing the Infantry attack on St. Privat is not stated, but there can be no doubt that if these batteries had been armed with quick firers they would have fired away every round they could during that trying half hour, and would then have had only the column ammunition for the remainder of the battle.

It may be argued that if these Prussian batteries had been armed with quick firers they would have beaten down all resistance so quickly that there would have been no necessity for the long continued rapid fire, but it must be remembered that the point from which the Infantry started, west of Ste. Marie aux Chênes, was some 3000 yards from St. Privat, and during the whole of that advance, until masked, it was the duty of the guns to keep down the defenders fire, which would certainly have reasserted itself had the guns slackened; and, as the Infantry could not, under the most favourable circumstances, have hoped to reach their goal under half an hour, the gunners, no matter what they were, must have been in action and maintaining for the whole of that time a more or less rapid fire.

From the above it is clear that with quick firers a much larger supply of ammunition must be carried either with the battery, or with the column or with both, and that if the supply with the battery is not increased the divisional ammunition columns must be so placed on the line of march as to be able to supply the batteries at a far earlier period in the fight than they can at present.

Now whichever of these necessary changes be adopted, it must be a decided disadvantage. An increase of battery ammunition means extra wagons, extra horses and extra men, brought together at the last moment (for it is very unlikely that they would form part of the peace establishment) requiring extra supplies of food and assisting to block the roads.

It may be suggested that a solution for this difficulty would be to decrease the number of guns in a battery to four, replacing the two guns by two wagons, and thus giving an extra wagon to each gun without increasing the number of vehicles in the battery; and an argument in favour of this would be that the battery of four Q.F. guns would probably be at least as powerful as a battery of six field guns, and that to effectively fight a battery of six quick firers might be more than one Commanding Officer could do; but past experience has shown that six guns is the best number for a battery, and until further experience shows that, under the altered circumstances, it is too many, it would be a great mistake to reduce the number, especially as the object to be gained is, not to make the new batteries as powerful as the old, but, as powerful as possible.

These same objections, in a lesser degree, hold good with regard to increasing the ammunition column.

But, if the battery ammunition is not increased, then steps must be taken to ensure the columns arriving in time.

With a battery of field guns, if the column can commence to supply within 2½ hours of coming into action, it should be sufficient; and, as the length of a division marching on a single road is only about four miles, there should be no difficulty in doing this; but, when it is considered that the quick-firing battery may expend all its ammunition in 25 minutes, within which time it must be able to receive supplies, if required, from the column, it becomes quite clear that the ammunition column can no longer march in rear of the division, but must follow the guns at a much smaller interval, even though by doing so it will hamper the other troops using the road.

There is yet another difficulty in the matter of supply. It has been shown how that it may be quite possible for a quick-firing battery to get rid of the whole of the battery and a good portion of the column ammunition during a battle; there would then only remain the ammunition park for immediate supply, and the ammunition to be obtained from it could not arrive for some hours and would only refill the gun limbers. From this it would appear that unless the ammunition to be carried by each source of supply is largely increased, a General will not be able to count upon his Artillery for effective action in a big battle more often than the time necessary to bring up fresh supplies from the advanced depôts.

(3) The ammunition will be heavier (for the same shell power), more expensive, and more difficult to make up.

One of the many advantages claimed for cordite when it was introduced for use in our field guns, was that the weight of the cartridge being reduced from 4 lbs. to about 1 lb. would enable so many more rounds to be carried without increasing the weight behind the teams; if, however, a metal cartridge case is now introduced the weight of each round will again be increased, and, unless fewer rounds are carried or structural alterations made in the limbers and wagons, the load will be greater. This may seem a trifling matter, but, if the cartridge case only weighs 1 lb. it will mean a difference of nearly 1½ cwt. per subdivision, added to which the metal cartridges will be more bulky and less easily packed; but the extra room which they will occupy, would probably be compensated for by not having to carry any tubes.

Conclusion.

And lastly, if the cartridges are to be contained in metal cases instead of shalloon bags, it will be a much bigger business "making them up," to keep up the necessary supply; if they are to be made up at the base the cases will occupy far more space for transport than at present, and if cases have to be made extra supplies will take longer to furnish from home.

To sum up briefly then the advantages and disadvantages. It has been attempted in the preceding pages to show that, in the course of a battle, occasions arise during which an increased rapidity of Artillery fire would be of the greatest importance, such as for Horse Artillery during a Cavalry combat, in repelling or preparing an assault, and that as frequently the ground will not admit of more than a certain number of batteries concentrating their fire on the objective, the possession of a quick-firing gun will be most valuable.

Also, that in war, irrespective of the actual pitched battle, there are times when a quick-firing gun might render most important service, as for example in advance and rear guard actions, the defence of defiles, etc.

And, lastly, that with this gun the increased rate of fire would be obtained with less actual labour to the men, and that there would be a possibility of carrying it on effectively, if necessary, with weaker detachments.

On the other hand it has been pointed out that, although it would be by no means even probable that the ordinary rate of fire with the quick-firing battery will be greatly in excess of that of a well-drilled field battery, still, should the occasion for rapid fire arise the extra rapidity of the quick firer would be so great that the present supplies of ammunition would be quite inadequate, and arrangements would have to be made for either increasing the battery ammunition or providing so that the ammunition column could supply sooner and also carry more; thereby increasing the lengths of columns and blocking the roads.

And, lastly, that the quick-firing gun and its carriage will be more complicated and likely to get out of order, and that the ammunition will probably be heavier for the same shell power.

From the above, the advantages to be gained appear so important and the disadvantages so comparatively slight and easily overcome, that it is little wonder that France and Germany are re-arming, and the other great Powers experimenting with a view to following their example.

Critics hostile to the introduction of a quick-firing field gun will no doubt lay great stress on the possible increased expenditure of ammunition and the difficulties in the way of keeping up the supply; but good drill and discipline will minimise waste, and every extra effective round that can be fired at the proper moment must help forward the cause.

Any who call to mind the months immediately preceding the outbreak of the great war of 1870 will remember the feverish excitement and secrecy which attended the manufacture and trials of the Mitrailleuse in France; with these new weapons the French believed they would make up for any deficiencies there might be elsewhere in their numbers and armaments, and the subsequent employment of machine guns has shown that they had a very powerful weapon, if only they had understood where and how to use it; here they were at fault, with the result that the new invention did nothing for them, and was a positive disadvantage on certain occasions when the ground taken up by Mitrailleuses might have been far more usefully occupied by field guns.

So with the quick firer; it will be all powerful if properly used, but if merely regarded as a means for firing more rapidly, irrespective of the tactical necessities of the moment, it will more than efface any good it might have done, and at the critical moment will be unable to fill its true rôle of "The friend in need."

THE ADVANTAGES AND DISADVANTAGES OF Q.F. GUNS FOR ARTILLERY IN THE FIELD.

BY

CAPTAIN H. W. BARLOW, ROYAL ARTILLERY.

"SHARP'S THE WORD AND QUICK'S THE ACTION."

COMMENDED ESSAY, 1898.

In dealing with the subject which forms the title of this essay, one is somewhat hampered by being unable to refer to the published results of official trials, carried out by the soldier, to test the durability and fire efficiency of the new system. It is well known that all the Powers have it under trial; but all of them, as far as I am aware, preserve a a strict official silence as to the results obtained.

A number of examples of the Q.F. system exist,* and the tests carried out by the manufacturers of them have, of course, been published; but these, though useful, in that they give us information as to the methods in which certain well known principles are applied to the end in view, afford most uncertain data on which to base argument.

It is a very stale commonplace that the only tests of the serviceability of any weapon or complete equipment, which can be accepted as furnishing trustworthy bases of discussion, are those carried out by the soldier. In his powers of breaking the unbreakable, and ruthlessly laying bare the weak points of any article under test, he is at once the admiration and the despair of the manufacturer.

This absence of reliable data has not, however, been the slightest bar to a voluminous literature on the subject in the periodical press of this and foreign countries; though, as far as I am aware, no exhaustive treatise on this burning question has yet been published which is impartial and constructive as well as critical, chiefly it is presumable, because those who really know think it desirable to keep their knowledge to themselves.

As is usual when a new departure, not well understood, is discussed, we find the extravagantly favourable predictions of the enthusiast (largely based in this instance on a rapidity of fire, which as far as I can see is not only improbable but impossible*), flat denial of any appreciably improved results by the disbeliever, and the convenient open mind of the unconvinced.

---

* I have seen the details of six.

As in my opinion a discussion on the hypothetical advantages and disadvantages of the Q.F. field system would be quite unprofitable without endeavouring first to determine, as far as may be, by reference to perfectly well-known conditions which cannot vary because of an improvement in one portion of a field equipment, what rates of fire we may reasonably expect, I have arranged the consideration of the whole subject as follows :—

(I.) To what causes exactly do the Q.F. guns of ships and forts owe their acknowledged superiority in rapidity of fire over existing field guns.

(II.) What are the essentials of Q.F. field gun ?

(III.) What is the maximum possible rate of fire we may expect from a Q.F. field gun under the most favourable conditions ?

(IV.) How far, having regard to the exigencies of fire control and observation of fire, supply of ammunition, &c., we may expect to be able to make use of this potential maximum rate of fire ?

(V.) The advantages and disadvantages, probable and alleged, ensuing from the adoption of a Q.F. field artillery with the characteristics and rates of fire previously determined.

N.B.—In the following pages the terms "Q.F. gun" or "Q.F. field gun" include the mounting or carriage in both cases. When the gun alone is referred to it will be stated.

(I.) COMPARISON OF Q.F. GUNS FOR SHIPS AND FORTS WITH EXISTING FIELD GUNS.

The rate of accurate aimed fire with the 12-pounder Q.F. of 12 cwt. using electric firing and percussion shell may be taken as about 10 rounds per gun per minute†.

The highest rate of "section" fire with ammunition ready prepared with our existing 12 and 15 pounder field equipments is two rounds per gun per minute and of "battery" fire, ammunition being prepared as required, one round per gun per minute.‡

From an examination of the drills, and a consideration of the nature of the service with the two forms of equipment above mentioned, and for the moment comparing only the rate of magazine fire with the field gun (when running up is not always necessary and laying is rough§), with the rate of the Q.F. gun, I am of opinion that the immense difference in rapidity of fire with the two equipments is due to the following causes.

---

* The most amazing rates are given, only in one instance less than 10 rounds per gun per minute (the Austro-Hungarian Q.F. gun for which 6 rounds per gun per minute is apparently claimed—see report in *Times* of October 8th, 1897), and sometimes as high as 20 ! ! On the other hand I have seen it argued in a French newspaper that the Germans, knowing that their field artillery equipment is inferior to that of the French, started a Q.F. re-armament and loudly proclaimed its advantages in order to compel the French to undertake an unnecessary re-armament and so lose the commanding position they would hold while Germany's Artillery is deranged by a change which has become imperative.

† The highest rate of which I have authentic information is five aimed rounds in 23½ seconds obtained from a 12-pounder Q.F. of 12 cwt. in H.M.S. "Excellent."

‡ Obtained from Annual Reports of School of Gunnery. These rates are the absolute maxima and are rarely attained.

§ Field Artillery Drill, 1896, page 114.

1. The great ease in laying a ship or fortress* Q.F. gun, which is handled by the gun captain very much as a rifle, with the advantage over the latter of an absolutely stable rest.

2. The fact that owing to the gun recoiling axially in a cradle (in which are the sights) and the pivot being central, the gun captain not only can stand up to the shoulder piece when the gun fires and continue to keep the gun on the objective, but the gun is hardly thrown off the objective when fired.

3. The gun captain firing immediately he has layed the gun and the gun is ready, without waiting for further order.

4. The metallic case containing the cartridge carrying its own means of ignition and therefore no tube having to be inserted or extracted.†

5. The time necessary to open and close the breech being reduced to a minimum.

6. Loading and laying being carried on simultaneously without confusion or difficulty.

7. The general compactness of the mounting, and the ease with which all duties can be carried out.

To the above seven causes must be added, as already stated, when we have to consider a possible acceleration of "battery" fire, the following, viz. :—

8. There being no necessity to run up.

Of the first seven of the above causes of rapidity, by far the most important are the 1st, 2nd, 3rd, 6th and 7th (the 8th is of course a *sine qua non* for *any* Q.F. equipment, and does not head the list because, in the comparison made, running up can be often omitted when using magazine fire).

The question therefore now arises as to how far we may expect to successfully introduce the above features, making for rapidity, into field Artillery equipments.

(II.) THE ESSENTIALS OF A Q.F. FIELD EQUIPMENT.

In addition to the essentials which go to make up the serviceability of *any* field equipment, ‡ and are, in my opinion, very well met in our existing equipments § (except those of an effective case shot and friction tube ‖), there are the following special requirements for a Q.F.

---

* The mountings of Ship and Fortress Guns are practically identical.

† With percussion firing the rate is not so rapid, but this difference, due to the percussion tube, will doubtless be overcome.

‡ For full particulars of the essentials, see Chapter II. of "Field Artillery," mentioned overleaf.

§ Some critics object to the weight of our horse and field equipments. They weigh as follows (taken from the handbooks) :—12-pr. of 6 cwt. : gun and limber packed—31 cwt. 0 qrs. 2 lbs. ; wagon and limber packed—31 cwt. 0 qrs. 22 lbs. 15-pr. : gun and limber packed, and including the weight of men carried (Mark I.)—41 cwt. 2 qrs. 0 lbs. ; (Mark II.)—41 cwt. 3 qrs. 4 lbs. ; wagon and limber packed, and including the weight of men carried (Mark I.)—42 cwt. 3 qrs. 0 lbs. ; (Mark II.)—42 cwt. 3 qrs. 16 lbs. In a recently published work, "Stray Military Papers"—papers as admirably written as they are full of extraordinary research—Colonel Hime (late R.A.), on page 182, lays down 30 cwt. for horse Artillery and 39½ cwt. for field Artillery as "the greatest weights that can be put behind the respective teams" (of *six horses*) "without the risk of foundering the horses in a long series of marches," and, as all who know his methods will expect, gives ample reasons for his opinion. In "Field Artillery," by Lieut.-Col. Pratt (late R.A.), 1896 edition, page 23, the weights found suitable from "recent investigations," are stated to be 32·7 cwt. for horse Artillery and 39·7 cwt. for field Artillery for teams of six horses.

‖ It is believed that the difficulties with both case shot and tube have been overcome.

field equipment, if anything approaching the rate of fire of the fortress Q.F. gun is to be obtained, viz. :—

1. A means for reducing recoil to a minimum so that running up shall be unnecessary. This is accomplished by projections from the trail, axletree, or wheels which "take" into the ground on recoil, coupled usually with a short independent recoil of the gun in the carriage (as in the 15-pounder on Mark II. carriage) to reduce jar and jump.*

2. Gear to enable the gun to be traversed independently of the carriage. This is an obvious necessity if the trail becomes fixed after the first recoil. (The amount of this traverse is limited by the jar and chance of overturning of the carriage when the line of recoil differs much from the centre line of the trail ; about 6° appears feasible).

3. Provision for the anchoring arrangements above mentioned to be rapidly put out of action and the existing system of brakes employed in the event of the ground being unsuitable, or a larger traverse being necessary than the independent traversing gear will allow.

4. Arrangement of the position of the elevating and traversing gears which will enable the gun layer to lay for both elevation and direction with *ease*, while loading is proceeding.

5. A tangent sight which can be left up when firing without any risk of becoming bent.

The above five special features are all that I consider need be added to equipments very similar to those now existing in order to produce a thoroughly efficient field Q.F. system,† and I believe that there will be no extraordinary difficulty in so providing them that they meet every requirement of active service. Indeed all of them have in one form or another been already separately tested and found perfectly serviceable.

ALLEGED ESSENTIALS.

Two other features are usually set down as essentials of the Q.F. system, viz. : the rapid motion breech mechanism, and the metallic cartridge case carrying its own means of ignition.

The "single motion" or other very rapid breech mechanism, combined possibly with an ejector for the fired tube, I regard in the light of a luxury, not a necessity, and only to be adopted if full experience and test prove its durability in a field gun.

But the metallic cartridge case carrying its own means of ignition I regard in a very different light, and I shall discuss it at some length, as I believe its use is not merely unnecessary, but eminently undesirable for the following reasons :—

1. It is really quite unnecessary. The extraction and insertion of the tube take place concurrently with laying and loading ; ‡ there-

---

* I am somewhat surprised that, as far as I am aware, no attempt has been made to utilize the system patented by Maxim in 1887, by which the waste gases of explosion impinge on a plate in front of the muzzle (through a hole in which the projectile passes) which is attached to the gun or carriage and so check recoil by actually pulling the gun or carriage forward. Doubtless, however, the enterprising inventor has further tried the system and found it wanting or we should have heard more of it. (For full particulars see Captain (now Major) Stone's Silver Medal Essay on "The Relative Importance of Mobility and Shell Power in Field Artillery," R.A.I. Proceedings, July, 1888.)

† See "Engineering" December 4th, 1896, for some interesting remarks on Q.F. Field Guns. They must however be read with caution as they are written with a view to extolling Canet's system of telescopic trail and hydro-pneumatic buffer.

‡ See Handbooks for 12 and 15 pounder guns.

fore, as long as the duties in connection with the tube are performed as quickly as the other two duties, no delay can occur. I think that this will always be the case, even though laying, which at present takes the longest time, be accelerated by the improved facilities with a field Q.F. gun.

With the fortress or ship Q.F. guns of the *smaller* natures,* loading and laying are so extraordinarily rapid that separate duties in connection with the tube would cause delay. Hence the necessity in these instances of a cartridge carrying its own means of ignition.

2. Its weight, which could not be reduced below 2 lbs. at the lowest computation, aluminium not having proved a success, and would therefore add 13% with the 15-pr. and 16% with the 12-pr. to that of the ammunition now carried, additions which I believe it would be extremely hard to meet.

3. Its cost, which would involve an addition of not less than 3s. 6d. per round (with a brass case), an increase on the cost of the existing cordite cartridges of some 100%.

4. Serviceability.—Though no trouble has been experienced with these cases when they are kept in stable magazines and supplied under a rigid inspection, there is every reason to believe that jolting in limbers (than which there is no severer test) would be extremely likely to deform them, and cause trouble both in insertion and extraction ; while if manufactured in the hurry and pressure which invariably occur in war, much more serious trouble might arise owing to defective cases. The case being the obturator there is no need to enlarge on the necessity of its perfection.

It will doubtless be noted that no mention is made here as to extra vehicles for ammunition (see pages 345, 346 and 347).

(III.) Maximum possible rate of Fire.

Although the introduction of a Q.F. system such as I have described must materially accelerate the service of the field gun, I cannot for the reasons which follow accept the very high rates of fire confidently predicted as obtainable from it.

In the first place unless a radical, and I think undesirable, change be made in that part of the existing drills which prescribe the sequence of events in connection with making ready and firing after the gun is loaded and layed (see 3 on page 339), we shall still have two more phases of service with the Q.F. field gun than with the fortress Q.F. gun. Granted these two phases are very short, they still take an appreciable time, probably not less than three seconds, even if immediately consecutive (and it must be remembered, when we come to consider "battery" fire, that every delay must be multiplied by six).

Next as to the *quality* of service which has to be rendered. As pointed out previously on page 339 the fortress Q.F. gun is not thrown appreciably off the objective when fired, and the layer stands up to the shoulder piece and continues to lay the gun. This can *never* be the case with a Q.F. field gun. *Some* recoil, though probably very little, is sure to take place, will cause a jar quite sufficient to prevent the layer standing up against a shoulder piece, and also throw the gun off the objective.

---

* In recent government trials with a 6-inch Q.F. gun, with a charge of 25 lbs. of cordite and a projectile weighing 100 lbs., ordinary De Bange obturation, and a tube separately inserted each round, 20 rounds were fired in 4 mins. 17 secs., including the time taken to cool the obturator. There was ejector mechanism for the tube.—*Times*, 15th December, 1897.

Moreover since we depend on the uncertain anchorage of a layer of earth it seems improbable that we can ever dispense with the standing clear of the numbers when the gun fires.

From these three causes alone it is highly doubtful whether the service of the Q.F. field gun will ever, under the most favourable circumstances and under conditions as nearly similar as possible (that is using ready prepared ammunition), be accomplished in less than double the time taken by the fortress Q.F. gun.

This gives a maximum *possible* rate of fire of about five rounds per gun per minute.

(IV.) MAXIMUM RATE OF FIRE PROBABLY OBTAINABLE.

In the case of " section " fire, when case is used, or when "magazine " fire, with rounds of shrapnel ready prepared, is employed, I can see no reason why the maximum possible rate of fire of five rounds per gun per minute cannot be maintained so long as the supply of prepared ammunition lasts. After this the conditions become much the same as for " battery " fire carried out at the utmost rapidity possible.

In the case of " sub-division " and " battery " fire with shrapnel shell and time fuze, the probable rate depends :—

1. On the rate of service of the gun (not including preparation of ammunition).
2. On the rate at which ammunition can be supplied with fuzes correctly set.
3. On the minimum interval between the firing of the guns to prevent confusion.
4. On the range of the objective, when "ranging," or when it is considered desirable to observe the burst of each round before the gun next in rotation fires.

The first of these conditions has been determined, viz., 5 rounds per gun per minute.

The second has also been practically fixed by actual trial on a very extended scale. The average time taken to fill two portable magazines with ammunition with fuzes correctly set is 2 minutes, 15 seconds, or 22½ seconds per round. This average is that of 47 horse and field batteries tested in 1897 at Okehampton, Glenbeigh, Shoeburyness and Lydd.*

The average of 22½ seconds should be much reduced in future, as it has been decided for the future to take off the canvas covers of the cartridges when the shell are fuzed.† The untying of the fastening and removal of these covers takes a considerable portion of the total time. If the fastening be a bow knot the time is reduced to 17 seconds ; and probably the time taken in future, when no covers are used, will not be much more than 12 or 14 seconds. On the other hand this does not include the time taken in carrying the ammunition up to the gun. Making an addition of 6 or 8 seconds for this and for difficulties which must be expected on service, such for instance as having to work with reduced numbers, &c., I believe an average of 20 seconds per round will be found very close to the truth.

---

* Annual Report, School of Gunnery, Horse and Field Artillery, 1897, pages 32 to 34.

† Annual Report, School of Gunnery, Horse and Field Artillery, 1897, page 9.

This fixes the maximum possible rapidity of fire at "battery" fire at 3 rounds per gun per minute when using shrapnell shell with fuzes set as required, having regard to ammunition supply only.

(It may be mentioned that the average rate of setting time fuzes, taken on the four years 1892 to 1895 is 8 seconds.*)

The third condition cannot be laid down, as it depends on the state of the fire discipline of the battery firing. It cannot be less than 3⅓ seconds at battery fire, owing to the limitations imposed by the supply of ammunition already mentioned.

The fourth condition cannot be fixed, as in addition to the length of the range itself, it is affected by several variables, the weather, the nature of the ground on which the projectile will strike, or the background against which the burst of time shrapnel will appear, the eyesight and quickness of thought and decision of the battery commander—in fact by all those variables which make correct observation of fire, without which effective shrapnel shell fire is impossible, the very difficult art which it is.

In the following table I have endeavoured to give approximations to the rates, on the assumption that the time between the firing of each gun varies with the time of flight, and with an empirical addition, increasing with the range, to give the battery commander time to make a mental calculation on what he observes and come to a decision as to any orders he may wish to give. I have, I think put this addition at the very lowest figure possible, and, when ranging under difficult conditions, it will have to be largely increased. The table however gives a very fair guide to the rates of fire which may be expected when ranging is completed, and "battery" fire carried out at rates which permit careful observation to be continued.

Range, yds.	Time of flight in seconds†	Addition for observation in seconds	Time between guns in seconds	One round per gun in
1000	2·38	3	5·38	32 secs.
1500	3·56	4	7·56	46 „
2000	5·04	4	9·04	54 „
2500	6·5	5	11·5	69 „
3000	8·3	5	13·3	80 „
3500	10·2	6	16·2	97 „

It is advisable, before closing my remarks on rates of fire, to shortly discuss a question which has been recently much debated—the advisability of adopting independent fire by sections or even individual guns, or, in order to reduce the time lost by the pauses between guns when retaining firing by rotation, to organize Q.F. field Artillery in batteries of four instead of six guns; for it is stated that, owing to an immensely accelerated service, guns must now stand idle waiting their turn to fire. This argument is, in my opinion, evidently based on the assumption of a rapidity of service in excess of that ordinarily obtained by even fortress or ship Q.F. guns.

---

* I understand that there is at present no prospect of any new pattern being introduced which can be set more rapidly.

† The times of flight employed in this table are the averages of the times of flight of the 12-pr. (6 cwt.) and 15-pr. guns for the different ranges.

Taking the maximum ordinary rate with the fortress Q.F. gun as 10 rounds per minute, or one round in six seconds, it is obvious that in a battery of six guns no delay would be caused by firing in rotation with one second interval, and a fortiori, if I am correct in the maximum rate I have estimated for battery fire, no delay can possibly occur with the Q.F. field gun when fired in rotation from a flank with $3\frac{1}{3}$ seconds intervals.

Even supposing delay were caused by fire in rotation, I do not for one moment believe the latter could be abolished. The appalling confusion in a battery habitually carrying on independent fire, even by sections, the immense difficulty in maintaining control, the almost certain waste of ammunition, the husbanding of which is of primary importance, present arguments so overwhelming that nothing further need be said to emphasize the necessity of maintaining our fire control, the growth of the experience of years, as it is in this respect.*

(V.) ADVANTAGES AND DISADVANTAGES OF Q.F. FIELD GUNS.

From the foregoing pages it will be seen that the Q.F. field artillery of which I propose to discuss the advantages and disadvantages will be organized in batteries of six guns, will differ from existing equipments only in certain details of the gun carriage, and not at all in ability to meet all service requirements,† will have a drill and fire discipline practically identical with those now in use, and will possess under favourable conditions rates of fire as follows :—

Battery fire—three rounds per gun per minute.
Section fire—five " " " "

I propose to deal with the disadvantages, probable and alleged, first.

The first probable disadvantage which I foresee, results from the carriage being fixed in the ground after the first recoil. Unless, therefore, when firing at an obliquely or laterally moving objective, a careful watch be kept on the independent traversing gear (see page 340) and the trail shifted when the limit of traverse is approached, it may very well happen that, just at the moment when a high rate of fire may be most desirable, the detachments will be occupied in extricating the guns in order to be able to lay.

Again, on soft ground, there may be difficulties in obtaining sufficient depression, since the tendency with a checked recoil is for the gun and carriage to revolve vertically backwards round the point of the trail and so cause the latter to dig into the ground.‡

Either of these occurrences will not only cause a diminution of fire, but that confusion which is very noticeable when the steady rotation of fire is upset.

There will also be a disadvantage, when using very rapid fire, in the undoubted difficulty in keeping count of the ammunition expended. This will throw a very heavy responsibility on those in charge of the ammunition supply. It is quite unnecessary to enlarge on the very serious results of a battery advancing, say, to decisive ranges in support of the infantry attack with an insufficient supply of ammunition.

---

* It may be urged against these arguments that the Navy employ independent fire with Q F. guns. This is the case, but it is forced on the Navy, owing to guns being frequently placed so that they cannot well be controlled in battery. Naval officers, I believe, by no means regard independent fire with enthusiasm. On the other hand the Infantry endeavour to continue fire by volleys by word of command as long as possible, although in this case the loss of rate of fire is very marked. (See "Musketry Regulations," 1898, page 82.)

† It may very well be that some years of experience and trial will be necessary to meet the unforeseen difficulties which are certain to arise. It has taken close on ten years to evolve our existing field equipments.

‡ Annual Report, School of Gunnery, Horse and Field Artillery, 1895, page 19.

ALLEGED DISADVANTAGES.

It has been urged that the introduction of the Q.F. system will necessitate the provision of more ammunition vehicles than is the case at present; and, as far as I can gather, the reasons on which this statement is based are broadly as follows :—

1. That Field Artillery, with the more extended rôle assigned to it, will, whether of the existing type or quick-firing, expend more ammunition than formerly.

2. That a Q.F. battery requires a greater supply of ammunition than one of the existing type, in order not only to meet the demands of rapid fire but to cover inevitable waste.

This is a most serious allegation and deserves the closest examination. Irrespective of expense—always an important consideration—any increase in the difficulties of ammunition supply touches a vital point in the conduct of Artillery in the field.

Taking the first of the reasons above mentioned, what is meant precisely by the word "formerly"? I assume that the war of 1870-1 is referred to, since that is the only war, since the introduction of rifled guns, in which the Artillery of at any rate one of the combatants played the part which it is asserted it is to repeat and more than repeat in the future.

Now the latter prediction, or at any rate the first half of it, is very possibly true; but nevertheless I cannot help thinking that deducing an extra expenditure of ammunition as its corollary is sometimes due to a confusion of thought, for when drawing inferences as to ammunition expenditure from this war, it is sometimes forgotten that the only projectile (case shot excepted) successfully used was the common shell fuzed with percussion fuze, employed by the Germans. The Bavarians and French used shrapnel shell with very disappointing results, owing to indifferent time fuzes and other causes.

Now it cannot I think be denied that a modern shrapnel shell when controlled by an accurate time fuze is, as a man-killing projectile, vastly superior to the common shell used in 1870-1. Allowing for the undoubted difficulties in getting from it the maximum results of which it is theoretically capable, I believe I shall rather under than over-rate its powers when I reckon that the effect of a given number of modern shrapnel shell should be at least double that of a similar number of common shell of the date referred to, assuming equal skill in the employment of both and such targets as would be ordinarily met with. If I am correct in my estimate, then clearly with similar opportunities only half the ammunition should now be used to attain the same results as were obtained by the Germans in 1870-1.

Before, therefore, the prediction that *more* ammunition will be expended in the battles of the future than of the past can be accepted as a certainty, it must be conclusively proved that Artillery in future will have double the opportunities of coming into action with reasonable hope of success which it had in 1870-1.

I am well aware that perhaps the greatest authority on modern Field Artillery has given it as his opinion that owing to coming into action earlier and at longer ranges, and remaining in action longer than formerly, "it must be that in future Artillery will expend a larger amount of ammunition than it did in the last war (1870-1)," * but with all deference I maintain that when making this assertion he does not take into consideration the immense superiority of modern shrapnel or sufficiently appreciate what *was* accomplished by the German Artillery in 1870-1. It is beyond dispute that owing to its overwhelming superiority to that of the French, the German Artillery was able to come into action anywhere and everywhere and generally to act in a manner which should have caused it to suffer almost prohibitive loss had it been more efficiently opposed.† Therefore, even allowing for the employment of Artillery at longer ranges than formerly, a proceeding which should be the exception rather than the rule, the case for increased expenditure of ammunition by Field Artillery of existing type in the wars of the future appears to me to remain "not proven."

Turning now to the alleged increased requirements of ammunition for a Q.F. Field Artillery, I maintain that on one ground only can this plea be maintained.

If by its rapidity of service Q.F. Field Artillery can obtain its ranges so quickly that it can take advantage of every favourable opportunity, however brief, to catch the enemy in disadvantageous positions and so inflict heavy loss on him ; it will, and *must*, expend more ammunition than has been the case hitherto, when, with a slower service, ranging has hardly been completed and effective fire brought to bear before the enemy, who doubtless will not stand on the order of his going, will have extricated himself and the golden opportunity be gone.

In other cases, to attain a given object, Q.F. field artillery should not employ a single round more than existing Artillery. Indeed, in a number of instances, it should employ less ; for it will be able by its superiority in rapidity to get in its rounds at the moments when the enemy offers the best target. Moreover the moral effect of effective fire when rapid is acknowledged to be much greater than when slow.

I quote here, in my text, as I regard them as far too important to be relegated to a footnote, the remarks of the Camp Commandant, Okehampton, on this subject in the Annual Report of the School of Gunnery, Horse and Field Artillery, for 1892, pages 37 and 38. Though written nearly six years ago they are forcible arguments in favour of a Q.F. Artillery, and against the notion that rapid fire necessarily implies increased expenditure of ammunition.

"RATE OF FIRE.

"This is a subject worthy of the most earnest attention, for it is certain "that other things being equal the Artillery which fire rapidly and "correctly must crush an enemy whose fire, however correct, is slower.

"*Nor need rapidity of fire mean expenditure of ammunition*" (I think there can be no doubt that *extra* expenditure is meant), "*for a rapid* "*rate of fire may do in a short time what a slower fire may never accom*-"*plish at all.*" (The italics are mine.)

---

* Prince Kraft's "Letters on Artillery," Col. Walford's translation of 1888, page 285. See also Home's "Precis of Modern Tactics," 1882, page 126, on which the same opinion is expressed in almost the same words.

† Von Schell, "Tactics of Field Artillery," official translation, page 9 ; and Pratt, "Field Artillery," 1896, page 89.

Lastly as to there being greater waste of ammunition with a Q.F. Field Artillery. If independent firing of individual guns, or of sections, be adopted, I cordially agree. If not, I can see no reason whatever to suppose that, because there is the power to fire rapidly it will be wantonly abused by Artillery Commanders, by their permitting rapid fire to be carried out without satisfying themselves that it is effective, and proportioned in quantity to the end in view.

As regards waste due to incorrect laying, setting of fuzes and generally to the service of the gun, there is every reason to believe that it will be less, for progress has not ceased.

I have now, I hope, made it clear that only with opportunities for coming into action in future, at least double those in the past, need it be anticipated that *any* increase in expenditure of ammunition must occur. Can it be confidently predicted that the Q.F. system will give not merely this immense increase in opportunity, but so much more as to necessitate a larger supply of ammunition vehicles? I very much doubt it.

The actual average expenditure of the German Artillery in 1870-1 in 9 battles was 45 rounds per gun, the greatest recorded expenditure was 245 rounds per gun.* Converted to modern shrapnel these numbers become 23 and 123 respectively. Our existing equipments for Horse and Field Artillery carry in the first line 142 and 150, in the Divisional and Corps Ammunition Columns 75 and 78, in the Park 150 and 76 rounds per gun respectively. In the case of Horse Artillery acting with a Cavalry Division or Brigade there is provision of 96 and 100 rounds per gun in the Ammunition Columns in the two cases.

It is unfortunate that no modern published results exist of comparative trials of the relative efficiency of shrapnel and the best forms of ring or common shell, which can absolutely decide the truth or otherwise of my method of dealing with this question.

If my contention as to the value of shrapnel shell be incorrect and I have over-estimated it, then it appears to me we are living in a fool's paradise, and the advisability of reverting to the use of ring or common shell should be seriously considered. The latter are incomparably more easy to use and therefore far more likely to give, in the field, the best results of the practice ground.†

A further minor disadvantage which has been attributed to the Q.F. system deserves a passing notice here. It is to the effect that owing to the heavy labour involved there will be difficulty in keeping up the supply of ammunition from the limbers or wagons to the guns. I think this objection is based on an exaggerated idea of the amount of rapid firing which will be carried out at one time. Moreover, there should be no difficulty in occasionally changing the numbers who perform this undoubtedly arduous duty. I quote in this connection some remarks on the most interesting practice (the only one of its kind of which I am aware) carried out by the 13th Field Battery, in June, 1893, when 979 rounds were fired.‡

---

* Pratt, "Field Artillery," 1896, page 39.

† Von Schell, in "Tactics of Field Artillery" (previously referred to), at page 152, especially recommends the use of common shell in the actions of Horse Artillery in conjunction with Cavalry, on account of its simplicity of manipulation and the moral effect of its burst. It must however be remembered that he wrote in 1877, when shrapnel was not so well understood as now. At the same time it must be borne in mind that we are the only nation which has dropped common shell altogether. Other nations carry a number either of ring or common shell.

‡ Annual Report of School of Gunnery Horse and Field Artillery, 1893.

In his report on the practice, the Camp Commandant, Okehampton, states :—

"Each detachment consisted of nine numbers, the number which would be carried on service with the battery. At the conclusion of over four and a half hours of actual firing it could not be said that the detachment showed any signs of fatigue ; indeed the rate of fire attained at the last series was the highest achieved. A few men complained of gun headache."

ADVANTAGES.

It is convenient to divide these into three classes :—

1. Those which accrue to the personnel.

2. Those which may be obtained in attack and defence against the three Arms, in a war against a civilized enemy.

3. Those which may be expected in war against an uncivilized or semi-civilized foe.

1. ADVANTAGES TO PERSONNEL.—In the first category, and due to the abolition of the necessity under ordinary circumstances to run up after every round, and thereby not only of one duty but also heavy manual labour for every number at the gun, and to the concentration of the duties of laying in one instead of two men's hands, we find the following, viz. :—

(1.) Ease of service.

(2.) Simplicity of service, and as a consequence,

(3.) Facility for working with reduced numbers.

I am of opinion that the gain of these three advantages, especially the first two, would alone justify the adoption of the Q.F. system even were the rapidity of fire no greater than hitherto ; for I am very sure that they will conduce to an accuracy of fire far superior to that hitherto attained, while their value to men jaded by the inevitable hardships and privation of active service can hardly be over-estimated, more particularly in the case of British Artillery so frequently performing its duties in tropical heat.

The third advantage speaks for itself. It is quite unnecessary to quote instances when guns have had to work undermanned in the past, in order to emphasize the certainty of their frequently having to do so in the future.

2. ADVANTAGES IN ACTION AGAINST CIVILIZED ENEMY.—ARTILLERY V. CAVALRY.—I assume that Artillery acts on the defensive, since cases when Artillery can be said to act on the offensive against Cavalry will probably be in the purely Cavalry actions in which Horse Artillery take part.

I believe it is admitted by all that Cavalry which makes a frontal attack *only* on well posted and well trained Artillery of the present day, rides to certain destruction ; and therefore we need only consider a flank attack.*

Always supposing that the Q.F. Field Gun can extricate itself from its anchorage (see page 340) reasonably rapidly so that a number of guns proportionate to the magnitude of the attack can come into action in the required direction, and that the Commander of Artillery with an exposed flank takes the common precaution of patrolling sufficiently far to that flank to give him time to make the necessary dispositions, rapidity of fire must be to the advantage of the Artillery, since successful defence depends in this case entirely on the number of shell which can be fired in a very short time. (It need scarcely be pointed out that since sufficient time is all important to the defence, the open ground which the Cavalry have to traverse before coming to close quarters must be of considerable extent.)

---

* It does not follow however that such attacks may not be made for some very important object, as for instance the charge of six German Squadrons at Mars-la-Tour on August 16th, 1870, which served its purpose, though the losses were some 75 per cent.

This is a very real advantage, for with the much bolder rôle assigned to the Artillery of to-day, it will often find itself in positions where it must look after its own flanks. This may especially happen when the batteries of divisional Artillery first join that of the Advanced Guard, especially if the position be at all to one flank of the advance. The small force of Infantry of the Advanced Guard may very well be occupied in clearing the ground to the front of the enemy's advanced troops leaving its Artillery considerably in rear, with but a small escort, probably of Cavalry only (possibly with none), the troops of the main body being also too far in rear to afford support. This state of affairs offers a promising opportunity for an enterprising Cavalry.*

ARTILLERY V. INFANTRY.—Taking the case of the attack first, I do not believe that Artillery now, any more than formerly, will be able alone to prevail in a direct attack on well posted, well disciplined and unbroken Infantry.† Undoubtedly a more rapid fire, if effective, besides having an important moral effect, will tend to inflict heavier losses in a given time ; but it must be remembered that a firing line of Infantry presents but a small, if a wide target, especially if advantageously posted ; and fire which not only looks, but *is*, extremely accurate, may often be ineffective. It will be in the support of the final stages of the Infantry attack that accurate rapid fire will have its most tremendous effects. It should (always supposing that the Artillery of the defence has been sufficiently crippled in the previous Artillery duel, and cannot therefore force a second Artillery duel), render the advance of the reserves to support the firing line, a task of extreme difficulty ; and, if the assault be successful, the presence of Artillery in close support of the Infantry, exhausted by its efforts, will be more than ever desirable to hold the position against counter-attack, which to be rapid must be, it is agreed, made by troops in fairly close formation. Except in these respects I cannot see that the rapid fire of the Q.F. gun will have an effect likely to upset our notions of the attack as accepted at present. I cannot but think that those who build theories on the effect of a rapid fire on difficult targets will be wofully disappointed ; and a careful watch lest ammunition be so wasted will be one of the most anxious duties of commanders. It will be on easy targets that rapid fire will naturally have its especially decisive effects. I therefore dismiss without comment the arguments of those who state that the Q.F. guns will give Field Artillery such power that in the battles of the future it will practically go in and capture positions, which the Infantry will subsequently occupy at their leisure, and with little or no loss. ‡

---

* Von Schell " Tactics of Field Artillery " (Official Translation), page 16.

† "Letters on Artillery," page 161, Von Dresky states his opinion, " I have found that it is impossible with Artillery fire alone to drive out *good* Infantry from a position." Although in 1870-1 only common shell were used, I believe the statement holds to-day.

‡ Home, in " Précis of Modern Tactics," 1882, page 57, describes such a proceeding as follows. " Such tactics are those that a leader having a raw undisciplined army composed of various nations, would adopt, trusting to the accuracy of fire of his Artillery. (Comments on the battle of Wagram.)

Taking next the case of defence. It is now accepted as an axiom that Artillery can easily guard its own front against Infantry, provided the attack be made over ground over which Artillery fire can be properly developed. It was proved to be the case in the war of 1870-1, and is even more certain to-day since shrapnel shell fire has increased the deadliness of Artillery fire, even were its rapidity not increased, while the range of the rifle has not been materially extended. On the other hand it would be just as insane to-day as it ever has been since the introduction of the rifle, to allow Infantry to approach close under cover, whether in front or on a flank, trusting to destroy it (the Infantry) in its advance over a few hundred yards of open ground. I am very sure that Infantry would never attempt to so advance until it had destroyed the gunners (which it should easily do with cover at any range below about 800 yards), after which it could advance and take the guns at its leisure.* There is no analogy between the defence against Cavalry and Infantry in this respect.

The danger of cover close at hand, especially should the Artillery be occupied by hostile Artillery, is exemplified by the events of the battle of König-gratz, in 1866, when 68 Austrian guns were captured by the Prussian Infantry which had crept up in standing corn to point blank range. Certainly the Austrian guns were enveloped in the smoke of their own furious cannonade, which will not occur now, but on the other hand Infantry attack will now be much more difficult to locate for the same cause, even though it fire as it advances.

ARTILLERY IN PURSUIT.—Here the power of rapid fire will be of the utmost advantage. The targets, disorganized troops painfully attempting to reform, or columns choking the exits from the field of battle, are just those easy targets on which, as previously stated, rapid fire can have its maximum effect, and the Q.F. gun will therefore enormously increase the power of Artillery "to turn a defeat into a rout."†

ARTILLERY IN A REAR GUARD.—The power of rapid fire cannot here materially alter existing conditions except perhaps in warding off Cavalry attacks. In any case the duties of Artillery in retreat are not so much to inflict heavy loss as to delay the pursuer ; but, were it otherwise, it could not frequently employ rapid fire for the reason that its only source of supply is from its limbers. It is impossible for it to keep its wagons close without running the risk of losing them, or being hampered by them if it has to take their safety into consideration.

ARTILLERY V. ARTILLERY.—In a war between civilized powers we may, I think, take it for granted that the Artilleries of both combatants will be armed with guns differing little in power or rapidity of fire, since the immense importance of Artillery is now fully appreciated ; indeed, as I have already pointed out, the pendulum of opinion has swung almost too far in the direction of confidence in its powers. The only advantage therefore which can be obtained in future will be, as now, in the better employment of the powers of fire by one side or the other. The side which makes mistakes should pay so dearly for them that the importance of skill in handling guns tactically, and a "fire discipline"[*] which will be as nearly as possible perfect as the class of men trained will permit,[†] becomes intensified.

---

* Such cover would give a great opportunity to machine guns.

† "Field Artillery Drill," 1896, page 32.

THE ATTACK gives the well known advantages, moral [‡] and tactical, of the initiative, though if the defender has chosen his position well the latter must be limited.

I cannot see that rapidity of fire, which will be presumably shared by both attacker and defender, can be said to materially alter existing conditions. If the attacker is able to bring a much larger number of guns into action than the defender, or if the latter has chosen his position so badly that the fire he receives is vastly more effective than that he gives, a decision will be arrived at sooner perhaps, but the conditions will not be otherwise changed and there will be, as far as I can see, no alteration in the sequence of events in the Artillery fight. As mentioned hereafter however, the advantages of indirect laying would seem to be increased.

THE DEFENCE.—On the other hand the defender should gain greatly by being able to employ rapidity of fire to the utmost.

In the first place there is no reason why with proper arrangements (assuming he accepts battle in a position of his own choosing) he should never be hampered with the cares of ammunition supply, and therefore should ever hesitate to employ rapid fire whenever there is a reasonable [§] prospect of its being effective. This is a most important advantage even under existing conditions, and will be increased in the future.

In the second, the defender should have ascertained the range of every important position likely to be occupied by the enemy, as is inculcated by every authority and regulation, and will therefore have the opportunity of pouring in a rapid fire not merely, possibly, when the enemy is advancing and unlimbering, but also when unlimbered he is endeavouring to range, assuming he employs direct laying. I cannot but think that this undoubted advantage which the defence, if not enormously outnumbered, will possess with a threefold accelerated fire, must make us reconsider our ideas as to indirect laying. The arguments against habitually employing this method, and the absolute certainty that it cannot be used when Artillery is called on to support the Infantry attack, or fire on a moving target, do not alter the fact that Artillery, ranging from a position where it càn be seen fairly easily by a skilful and as yet unshaken opposing Artillery, which is already in possession of the range (or sufficiently so to verify it rapidly) must run a tremendous risk ;[‖] and the question naturally arises whether the moral advantages of a bold disregard of cover coupled with the greater ease of ranging when laying directly will compensate for heavy losses. An adequate discussion of this most important question would demand an essay to itself, and cannot be entered on here, but the introduction of the Q.F. Gun will compel a definite decision sooner or later.

---

[*] As defined in "Field Artillery Drill," page 97.

[†] The immense advantage of conscription in that it gets good intellects as well as good bone and muscle into the ranks, is one of the strongest arguments in its favour.

[‡] "There is a great moral power in the offensive ; the assailants are moving—doing something behind a mysterious curtain that the defenders know nothing of ; there is something peculiarly demoralizing to men in waiting anxiously, with nerves at a high state of tension, for something, they know not what, to begin somewhere. In these respects improved arms have not increased the power of defence." Home, "Précis of Modern Tactics," 1882, page 105.

[§] Rapid fire on the mere chance of success, even if there be ammunition to spare for it, is very undesirable. It will generally be ineffective and have the bad effect of giving confidence to the enemy.

[‖] See "Artillery in the Field," by Brig.-Genl. Spragge, R.A., in R.A.I. Proceedings of January, 1898, pages 22 and 23, also excellent articles by Major Keir, R.A., and Capt. Headlam R.A., in R.A.I. Proceedings of May and July, 1897, respectively.

CHANCE ENCOUNTER.—In the chance encounter between two forces, the attacking Artillery, as now, will have the advantage of the initiative, but in other respects, assuming no great disparity in numbers, or exceptional advantages favouring one side more than the other, the issue will depend on skill only.

HORSE ARTILLERY ACTING WITH CAVALRY.—If there is anything certain as to the action of Horse Artillery in this case (and there is not much), it is that its opportunities will be fleeting and its fire rapid, and therefore the power of pouring in a rapid fire must be of the utmost advantage to it. Again when in pursuit or forming a rallying point for its own Cavalry if defeated, its target will be Cavalry moving fast and consequently its fire must be as rapid as possible.

The Q.F. System will therefore, as far as can be seen, add immensely to the importance of Horse Artillery when acting with Cavalry.

WAR WITH AN UNCIVILIZED FOE.—The power of rapidity of fire in this case can but be an unmitigated advantage.

It is scarcely necessary to point out that the chief danger in these wars is the rush of a mass of men, frequently fanatics, brimful of courage, and needing an amount of killing which is amazing. In such cases as these, tactics are at a complete discount, fire is everything, and the result depends merely on whether a sufficient number of the enemy can be slaughtered before they break in the opposing lines by sheer weight. Had our guns at Maiwand been quick-firing and sufficiently supplied with ammunition the result would have been very different. It is well known that a few more shell and a bold forward movement by our Infantry, were all that were needed at one period of the action to have turned the tide to success instead of failure.*

Of course when attacking such a foe good tactics are of avail, and the value of rapid fire will also occasionally be experienced, but it is notorious that the most decisive battles are those in which the civilized army has to assume the defensive. The victory or defeat is usually rapid and crushing.

The methods of war of uncivilized peoples do not lend themselves to successful defence which requires the tenacity of disciplined forces, and when they accept the defensive they are not often successful. Indeed if they do not assume the offensive it is comparatively rare for them to be brought to decisive battle at all, and a guerilla warfare results, peculiarly trying to civilized forces.

The above remarks apply to semi-civilized peoples also, but to a less degree ; since civilization tends, by installing a knowledge of the hopelessness of a contest against the better disciplined forces and larger resources of a civilized foe, to weaken the wonderful courage of ignorance.

CONCLUSION.

In conclusion I shall discuss a statement which I have seen, which is to the effect that the introduction of the Q.F. gun will, owing to its rapidity of fire, enable the force of Field Artillery which it is now deemed expedient to keep up, to be considerably reduced, and that great economy will ensue thereby.

---

* " Afghan War," by Hensman, pages 554-5.

No one has, as far as I am aware, exactly laid down the amount of reduction feasible, but I have seen batteries of four guns advocated, for the sake of economy and also to secure rapidity of fire when firing by rotation (this latter proposal has been previously discussed at page 343), and this suggestion will serve as well as another for purposes of discussion.*

Now although this proposal can only be moderately logical on two assumptions, viz. : that the requisite fire power of the Field Artillery with an Army is a constant quantity which it is no advantage to increase, and that all nations will be content to take advantage of the new system merely to gain economy rather than increased efficiency—neither of which is in my opinion tenable—it is well worthy of consideration since it is obviously based on the idea that fire *power* varies directly as rapidity of fire, and as such is opposed to the principles on which we may legitimately claim advantage for the Q.F. system in the field.

I will address myself to the plea of economy first since it is always a powerful one.

It is apparently forgotten by those who counsel reduction of guns that the four-gun battery can only be equal in effect to an existing one of six by the expenditure of about the same quantity of ammunition, and consequently must have the same means of ammunitiom transport as the latter. This means that the four-gun battery must have about the same number of drivers, draught horses, limbers and wagons as an existing six-gun battery, the only reduction possible being that of one lieutenant and the N.C. Officers and detachments (and in the case of Horse Artillery the riding horses of the detachments) of two guns.

I do not think there could be any diminution in this case of battery staff, artificers, artificers' and baggage vehicles ; though possibly such might be effected were three Q.F. guns assumed equivalent to six existing guns, and a six-gun Q.F. battery provided with the same ammunition transport as *two* existing batteries adopted.

Now I take it that the only way to test the real economy effected by a change is to compare the saving and the loss of the article on which the saving is made. The value of fire power cannot, I am aware, be accurately appraised in money, but it is the only comparison possible in this instance and so I make it.

With the four Q.F. guns instead of six in a battery, the *potential* fire power lost is undoubtedly that of two guns or 33 per cent., and the savings effected 16·2 per cent. in the case of a Horse Artillery and 13·6* per cent. in that of a field battery, both on the existing higher establishment.

With one battery of six Q.F. guns as described above, instead of two of existing type, the potential fire power lost is 50 per cent., and the savings 30·98 per cent. and 29·5* per cent. with Horse and Field Artillery respectively.

In both cases the savings and loss of fire power balance so badly that I cannot regard the changes proposed as economical in any sense, especially if I be correct in my previous arguments that the existing ammunition transport will suffice whether the Q.F. gun be adopted or not (see pages 345, 346 and 347).

---

* For details of calculation see appendix.

But the basis of the proposal is untenable. The fire power of an Artillery cannot be judged under all circumstances by its possible maximum rapidity. Immediately observation becomes difficult the Q.F. gun can do no more than the existing one (as I dismiss the possibility of a commander pouring in a rapid fire on the mere chance of its being effective), and its only advantage is that of a simpler and easier service (see page 348). Moreover a larger number of guns must always have the advantage over a smaller in concentration of fire, even though it be slower. A smaller number of guns on the other hand, however rapid their fire, must for a time leave a portion of the larger number at peace. It cannot cover the whole target at once, even allowing for the cone of dispersion of shrapnel. To trust to this latter is especially unsound when Artillery is the target, since the personnel is not distributed evenly over the whole front, but in groups having some depth.*

I maintain therefore that while a given number of Q.F. guns will, under favourable conditions, have a marked superiority over an equal number of existing field guns, that superiority cannot be by any means always expected. Just as the magazine rifle will have immense value for rapid fire at very short ranges—and no one dreams of using "magazine fire" at long ones, if control can possibly prevent it—so the Q.F. field gun will have great advantages when targets and observations are easy.

As such favourable opportunities will be exceptional and usually brief, it will only be when they are instantly seized and made the most of, that the full advantages of the Q.F. gun will be reaped.

Its adoption therefore can only be claimed as an advantage by that Artillery which can use it with promptitude and skill. The indifferently trained Artillery on the other hand, to which it but offers increased power to waste ammunition, must regard it with dismay as a powerful engine in the hands of the adversary.

Skilful tactics and perfect fire discipline will now more than ever be the determining factors of success on the field of battle.

APPENDIX.

The annual charges for batteries of Horse and Field Artillery on the *higher* establishment (including *every* form of expense, not merely pay) are £15,123 and £13,773 respectively. Consequently savings commensurate with the reduction of two guns should be £4,990 and £4,545 in the two cases. The *actual* savings, owing to establishment for ammunition supply having to be retained, are :—

---

* When firing at a moving target using a ranging section the want of power with a four-gun battery has been specially noticed.

	HORSE ARTILLERY.			FIELD ARTILLERY.		
	£	s.	d.	£	s.	d.
Pay of 1 Subaltern*	170	6	8	123	3	9
Pay and charges for 2 Sergeants	178	0	0	172	0	0
Pay and charges for † 2 Bombardiers ...	136	9	2	130	9	2
Pay and charges for 24 Gunners	1298	8	0	1195	4	0
Forage and charges for 16 Riding Horses	480	0	0			
Forage and charges for 4 „ „				120	0	0
Ten per cent. on value at £45 each to cover interest and remounts, &c. ... ... on 16 Horses	72	0	0			
Ten per cent. on value at £45 each to cover interest and remounts, &c. ... ... on 4‡ „				18	0	0
Ten per cent. on value of two guns and carriages at £600 per gun and carriage, to cover interest, repairs and renewals ...	120	0	0	120	0	0
Totals...	£2455	3	10	£1878	16	11

These totals work out to 16·2 and 13·6 per cent. respectively.

Were six guns to do the work of 12 the savings would be £15,123 and £13,773 (the cost of complete batteries of six guns) *less* the following :—

	HORSE ARTILLERY.			FIELD ARTILLERY.		
	£	s.	d.	£	s.	d.
Pay and charges for 6 Corporals† ...	436	16	0	418	16	0
Pay and charges for 38 Drivers‡... . .	1998	16	0	1892	8	0
Forage and charges for 6 Riding Horses...	180	0	0	180	0	0
Forage and charges for 76 Draught „ ‡	2280	0	0	2280	0	0
Ten per cent. on value at £45 each to cover interest, remounts, &c. ... ... on 82 Horses	369	0	0	369	0	0
Ten per cent. on value of 12 limbers at £280 each and six wagons at £250 each, to cover interest, repairs, &c.	486	0	0	486	0	0
Totals...	£5750	12	0	£5626	4	0

That is savings of £9,373 and £8,147 or 30·98 per cent. and 29·5 per cent. in the two cases (reckoned on the value of *two* existing batteries).

N.B.—The savings would really be much less in both the above cases were the percentages taken on the values, not only of the batteries but the ammunition columns and parks in addition, which to be strictly accurate should be done. In other respects the above figures may be relied on as nearly as possible correct, having been obtained from the best possible sources.

---

* The rates of pay are averages on those laid down for lieutenants of different service, and in the case of Field Artillery includes 2nd lieutenants.

† One corporal per sub-division is retained to take charge of the drivers.

‡ Includes spare.

J.F.R

THE ADVANTAGES AND DISADVANTAGES OF Q.F. GUNS FOR ARTILLERY IN THE FIELD.

BY

LIEUTENANT A. S. BUCKLE, Royal Artillery.

"NEC TEMERE, NEC TIMIDE."

COMMENDED ESSAY, 1898.

Introduction.

Artillerymen of the present day have, in modern field guns of ordinary type, unquestionably very formidable weapons : when properly handled there is no doubt that they enable us to carry out to the letter Prince Kraft's famous dictum as to our three duties of "hitting." The guns themselves shoot accurately. They are possessed of sufficient mobility to be brought up to the scene of action in good time, and to be expeditiously moved from point to point of the battle-field when the course of the fight necessitates a change of position. Most modern equipments are sufficiently strong and simple to stand fairly well the wear and tear of service, and the many severe trials of mechanism and of structure which will assuredly have to be encountered in war. Their fire can be kept well under control. The field guns of most nations at the present time fire an effective projectile as regards man-killing power (5 times as effective, according to an authority,* as was that with which the German Artillery won battles in 1870). The question to be discussed in this essay is whether it is worth while to try to introduce an equipment with which it shall be possible, when necessary, to "hit" the enemy much harder, by raining upon him a great number of such projectiles in a short time—a considerably greater number than could be fired in the same time from the present guns, even by the utmost efforts of their detachments : but an equipment in which there is a risk of being compelled to sacrifice one or more of the above-mentioned advantages, undoubtedly possessed by the "simple" field gun of the present time.

The word "simple" is used in this instance and in the following pages, for convenience, to describe the ordinary B.L. field guns at present in use, as opposed to Q.F.

---

* Colonel Walford, R.A., as quoted in "Achievements of Field Artillery," p. 158.

Definition of a Q.F. gun.

A Q.F. gun may be defined as one which is so constructed and mounted that it may be loaded, layed, and fired quickly; that is, quickly as compared with an ordinary B.L. gun. For use on board ship or in a fort, where there is no objection to extra weight or complication, it is now easy to produce Q.F. guns (even of large calibre) that can be fired "from the shoulder," as it were, like a rifle; and the operation of loading can be simplified by the use of fixed ammunition without disadvantage; moreover in such positions the supply of ammunition to these guns presents no serious difficulty. With a Q.F. equipment for use in the field, however, it is a very different matter: the question of the adoption of such an equipment demands the most careful consideration and experiment.

Arrangement of subject.

It is proposed in this essay first to discuss the subject generally, then to observe what has already been done towards the evolution of a satisfactory Q.F. field equipment, and finally to summarize the whole.

I.—ADVANTAGES AND DISADVANTAGES.

Advantages.—Increased power given by use of Q.F. guns.

It must, I think, be admitted by all that to be able, at will, to deliver an *extremely rapid* fire (provided it be also *well directed*) would be of vast importance to Artillery in the field: an Artillery commander whose batteries were armed with Q.F. guns would have, when he chose to use it, and used it properly, an enormous power which he cannot at present possess to the same extent. "Fire is everything, all the rest nothing," was the dictum of the great Napoleon with regard to Artillery; and any increase in the intensity of Artillery fire means a gain of effect both material and moral, an increase of power.

Decisive effects are produced by rapid fire.

In the battles of Napoleon's days the decisive effects that were produced by Artillery fire were obtained by rapid fire, at case ranges. The opening cannonade in the days of smooth bore guns was no doubt slow: "It was never, and was never meant to be, decisive. When a decisive effect was called for, those leaders who understood how to turn guns to account massed them against the intended point of impact in the hostile array, and then a very rapid fire of case was poured in at ranges within . . . . 400 yards. To produce a decisive effect it was found that there should be no lull in the storm of missiles . . . ." *

And these last words are true of Artillery to-day. Ranges have increased, but decisive effects are still obtained by the use of rapid fire. To see this one has only to study our present regulations, and they are founded on principles that have been practically successful in modern warfare. Thus on p. 29, "F.A. Drill, 1896," it is laid down that, in the support of the Infantry, attack "the range should be decisive, and the fire should be rapid:" again, rapid fire has to be used in short "bursts" when firing at a moving target, to obtain the maximum of effect during short spaces of time; in "magazine fire" for repelling Cavalry attacks; and when at case range, as in the old days. The most important instance, perhaps, is at p. 38, where in the Cavalry fight the fire of the Horse Artillery acting with the Cavalry "should be rapid," at the critical moment of the struggle.

Opportunities for use of rapid fire.

Numberless instances have occurred in warfare, are constantly seen at manœuvres, and will occur again in war, of an enemy temporarily exposing himself at a disadvantage: moments when a vast amount of damage may be done to him if the opportunity can be grasped, but must be done in a short time, before he can repair his mistake. Such instances crowd upon the memory or imagination—Artillery incautiously showing itself on the march, or unlimbering in a position where its arrival is not unexpected or the range of which is known, Cavalry or Infantry crowded in a defile, or the like.

---

* "Achievements of Field Artillery," p. 159.

In all these cases decisive effects may be obtained, but to obtain them *rapid fire must be used:* and an equipment that enables rapidity of fire to be increased has thus much to recommend it.

It will be well now to consider to what extent rapidity of fire would be increased by the introduction of a Q.F. field equipment.

Rate of fire with "simple" guns.

Results obtained on the practice ground* show that a good rate of "magazine" fire and "case" fire at Cavalry and "surprise" targets, from modern "simple" field guns, is from two to two and a half rounds per gun per minute. At longer ranges the fastest times seem to fall to only about one round a minute per gun; but I believe that rapid fire has lately been tried at medium ranges, when the rate per minute arrived at was about two rounds per gun. For ordinary purposes the average rate of fire (other than "magazine" fire or with case) is found to be only about four to five rounds per minute from a battery of six guns: that is without getting bad shooting, or in other words without waste of ammunition. As far as rapid fire with "simple" guns is concerned however, we may, I think, safely take its rate at about two rounds per gun per minute.

Rate of fire to be expected with Q.F. guns.

Now Q.F. field guns can undoubtedly do much more than this, but we must be careful not to over-estimate the rate of fire proposed to be obtained with them, for the following reasons.

It is quite possible to make a Q.F. gun, intended for field service, with which 20 unaimed or 12 or 15 aimed rounds *could* be fired in a minute; but we can only expect to attain this rapidity on the proof range or experimental practice ground, where all conditions are favourable—excellent layers, smart detachments well accustomed to the piece, ammunition prepared and ready to hand, easy range and well-defined targets, and, above all, absence of an enemy. It is not possible that similar results would be obtained by detachments composed partly of half-trained recruits or young soldiers, partly of reservists just called up on mobilization and probably making the acquaintance of the gun for the first time; such detachments working their guns in the hurry and bustle of the fight and under the mental stress of hostile fire, their enemy perhaps hardly visible.

Moreover fuzes must be set, and set accurately, or the shell may just as well be thrown away; and the rate of fire of eight rounds per minute per gun, suggested as feasible by a French author,† gives less than eight seconds for the setting of each fuze; it is therefore probable that such a rate of fire could not be kept up without previous preparation of the ammunition—except at the ranges at which we now use "magazine" fire, for which no preparation of fuze is required. In the examination in fuze-setting 1′ 30″ is allowed by the "Instructions for Practice" for setting six fuzes, so we may say a first-class fuze-setter takes nearly 15 seconds on the average to set a fuze accurately: we must therefore allow at least that time between the rounds, which gives about four rounds per minute as the highest rate attainable, even with a Q.F. gun, at long and medium ranges ; unless there has been an opportunity to prepare the fuzes beforehand for rapid fire at a range already found and with the length of fuze already verified.

---

* See remarks by Col. Marshall, R.A., in the discussion on Major May's lecture on "Co-operation between Guns and Cavalry."—R.A.I. Proceedings, May, 1895. See also Okehampton reports.

† "La question actuelle de l'Artillerie de campagne."—Revue Générale des Sciences, 15/10/97.

Immense effect of a well directed rapid fire from Q.F. guns.

Allowing then four rounds a minute as a fair average to be expected in rapid fire with Q.F. field guns with fuzes not previously prepared, and given that the range and fuze have been accurately determined, with a six-gun battery we have 24 shrapnel bursting on the enemy during each minute of the rapid fire ; or, allowing about 160 bullets in the shell, as in our 12-pr. shrapnel, a shower of nearly 4,000 bullets in the same time. Every two and a half seconds a shrapnel would burst, dealing forth death, wounds and terror—the latter multiplied exceedingly by the terribly quick succession of such crushing blows. It is incontestable that under such a murderous hail an enemy, whether horse, foot or guns, would crumble away and disappear ; the material effect would be great, the moral effect would be *irresistible*—nothing, not even the best troops in the world, would be able to stand against it. How much more fearful would be the effect when using fuzes already prepared, when the rate of fire might be as much as eight rounds per minute from each gun, or twice as fast !

Higher rate of fire more likely in defence.

It does not seem likely however that an opportunity would very often occur on service, at any rate in attack, for a number of shell to be got ready beforehand with fuzes set for a rapid fire on a certain point, though series of three or four shells might be so prepared for use against moving targets : the occasions above mentioned, when a rapid fire of time shrapnel would produce extraordinarily decisive effects, as a rule come suddenly or unexpectedly. It is thus apparent that though Q.F. guns *would* have opportunities for rapid fire in attack—more especially in the close support of the Infantry attack—and would then doubtless produce enormous effect, their highest and most effective rate of fire may more probably be expected in defence, where there is more likelihood that ranges and fuzes may be found beforehand and ammunition prepared for an annihilating fire on selected points.

Advisability of arming H.A. acting with Cavalry with a suitable Q.F. equipment.

But at the ranges at which "magazine fire" is used, when shell could be taken straight from the limber boxes and loaded without touching the fuzes, the higher rate of fire and the correspondingly larger increase of effect might always be expected. It is for this reason that it seems right that Horse Artillery acting with Cavalry should be armed with a suitable Q.F. gun, for we may expect that when so acting most of its fire, at any rate its fire at the decisive moment of the fight, will be at these ranges. The chance may last two minutes or less, but thus armed its fire would be crushing, *even in that short space of time*, and would probably decide the action by sweeping the enemy's horsemen off the face of the earth, especially if the Horse Artillery of the opposing force were not endowed with similar powers. Thus however doubtful may be the advisability of arming Divisional and Corps Artillery with Q.F. guns, it appears of vital importance that some such provision should be made for Horse Artillery when acting with Cavalry.

(It must be remembered, nevertheless, that this decisive effect could only be expected where the H.A. Commander exercises the greatest discretion in his use of rapid fire, in reserving it for the decisive moment ; for in five minutes of rapid fire he could expend all the ammunition in his limbers, that is probably all available for the fight.)

Effect of Q.F. guns on the "Artillery duel."

From these considerations it would appear that in the "Artillery duel" an Artillery armed with Q.F. guns would, other things being equal, get the better of an opposing Artillery not so provided. Though the ranging could not be hurried, and would take as long with one kind of gun as with the other (the fire discipline of both sides being, like the rest, equal), the effective fire of the Q.F. guns with range and fuze found could, and would, be made more intense than that of the "simple" guns: concentration of fire on successive portions of the hostile line of guns could thus be rendered less necessary, as the crushing effect of the distributed fire of the Q.F. guns might of itself almost suffice to take its place. With equal numbers of guns on either side the Q.F. guns, instead of being obliged to leave some of the opposing guns unmolested, might thus keep them all continuously under a fire whose effect might equal that of a concentrated fire of "simple" guns.

Their importance to an Artillery small in numbers.

It follows that an Artillery armed with Q.F. guns might successfully cope with one much its superior in point of numbers, but using "simple" guns. For this reason it behoves us more especially, whose numbers are so small compared with those of Continental Armies, to consider very carefully not only before we decide to adopt some form of Q.F. gun but to do so even more carefully before we decide *not* to adopt them.

Firing at moving targets with Q.F. guns.

A few words may here be said as to shooting with these guns at moving targets. It will be shown later, among their disadvantages, that at rapid fire with them there can be no control by section commanders—"rapid fire" being by individual guns as parts of the whole battery, and so quite different from our present "section fire," or rapid fire by sections, controlled by the section commanders—and it would therefore seem that in the case of fire at a moving target the Battery Commander might use one gun as a "ranging gun," instead of employing a "ranging section," and thus have five guns instead of four available for the *effective* fire of time shrapnel (or three guns instead of two in a 4-gun battery): one Q.F. gun being fully equal to the task imposed upon the two "simple" guns of the "ranging section." The procedure would be in other respects the same as at present, except that the Battery Commander could give ranges and fuzes for, say, two *series* of "rapid fire"—perhaps three rounds in each series—instead of for two *rounds* of time shrapnel as now. Putting aside for the moment the question of loss of fire-control, we here see well exemplified the chief advantage of an equipment capable when necessary of a very rapid fire.

Six guns or four guns in a Q.F. battery?

The question whether the introduction of Q.F. field guns will render the reduction of the number of guns in a battery from 6 to 4 possible or advantageous is one that has been much discussed, and we may here briefly recapitulate the arguments brought forward on the subject. It is certain that a battery of 4 Q.F. guns could, as far as the powers of the guns themselves are concerned, keep up an uninterrupted fire from flank to flank as easily as can one of 6 "simple" guns, so that so far the change would be quite possible. Those who favour the change urge that a 4-gun battery (while being as powerful as a 6-gun battery of "simple" guns) is easier to command than one of 6 guns—an important consideration in view of the increased difficulty of fire-discipline to be noted later; and takes up less room on the field, another important consideration in these days when masses of Artillery are pushed to the front at once, and when often room cannot afterwards be found for more batteries, as they come up, to come into action. Some would keep the present number of guns with an army corps, but divided up into 4-gun instead of 6-gun batteries; giving 50% more batteries, each of equal (if not greater) power than the former ones, and thus increasing the total strength of the Artillery by 50%.

Against the change it may be argued that losses in action in a 4-gun battery are *proportionately* heavier than in a 6-gun battery, as may be seen by considering the proportionate effect of putting one gun out of action in each: and as many men and horses will be hit in the one as in the other unless the 4-gun battery comes into action at 30 yards interval instead of 20, when the advantages of comparative ease of command, and of economy of space in action disappear: while the idea of increasing the number of batteries, by breaking up the present guns with an army corps into 4-gun batteries, would cause a prohibitive increase of expense.

A sort of compromise has been proposed with a view of avoiding the above difficulties: by making the number of 4-gun batteries about one-fifth greater than that of the original 6-gun batteries, the relatively greater vulnerability of the former would appear to become approximately balanced by the greater power to be expected of this increased number of batteries, each equal in fire effect to one of the latter: and this, it is pointed out, could be done without any increase in expense beyond that incurred for the officers and staff of the new batteries.

With a 4-gun battery I think a very good system of ammunition supply might be worked out by giving each eight wagons, to form two lines of wagons, and keeping the same number of officers as in a 6-gun battery; a large number of rounds would then be available per gun, and each line of wagons would be under an officer. Also the change from peace establishment, as now laid down, to war strength would be simplified: all that would be necessary would be to horse six wagons, and the baggage wagons, store wagon and forge.

These considerations appear to make the balance somewhat in favour of 4-gun batteries. I think, however, that it must be urged in favour of keeping batteries of Q.F. guns with six pieces, as now, that 6-gun batteries *can* be efficiently commanded; that the larger number of guns in a battery would allow of a more deliberate rate of fire *per gun*, for ordinary purposes, and would thus leave the gunners fitter for the strain of rapid fire; and that, if a 4-gun battery of the new weapons is to be as powerful as a 6-gun battery of the old, a 6-gun battery of Q.F. guns would be proportionately more effective at decisive moments.

Disadvantages: additional difficulty in ammunition supply.

Let us now turn to the disadvantages of these guns for use in the field. The first that naturally occurs to the mind is the certainty that their use will cause additional difficulty in ammunition supply. Increased rapidity of fire of course means that more ammunition must be brought up in a given time to replace the increased expenditure, otherwise the guns will run short of ammunition, and become defenceless and useless, perhaps at the very moment when they are most hardly pressed, or when their services are most urgently required in support of the other arms. The greater power of Q.F. guns would then become non-existent, nay, had been better not given them. As Prince Kraft, in his "Ninth Letter on Artillery," says, "It is of the very greatest importance that the expended ammunition should be replaced at the proper moment, for what effect on an action can a line of Artillery produce when it has no more ammunition?"

The question of replacement of ammunition in the course of a lengthy action already presents serious difficulties, with "simple" guns, and will tax very heavily the powers of those responsible. We know that in war, with the guns we now have, captains of batteries and their immediate subordinates will have to exercise much foresight and skill, and will have hard work, to ensure that the ammunition carried with batteries shall be supplied to the guns without a pause : and the *immense* difficulties which those in charge of ammunition columns will have to contend with—long marches, almost night and day, by ways cut up by the passage of the fighting troops, and encumbered with more troops hurrying to the front, with crowds of wounded and stragglers, and with other impedimenta—are fully recognised.

How much greater then will be the difficulties which we may expect to have to face, when it becomes a question of replacing the additional expenditure that must ensue if guns are to be employed that have a much higher possible rate of fire, a power of which their possessors will undoubtedly endeavour to make the fullest use! Not only would the number of rounds carried with the batteries have to be increased, but they would have to be supplied to the guns in a shorter time than at present, a twofold increase of effort on the part of those carrying out the supply. Moreover in every considerable battle the appearance in good time of the ammunition columns would be *absolutely necessary.* That this is not the case with "simple" guns we know from the experiences of Prince Kraft and his Artillery of the Guard: though they were obliged to have recourse to their ammunition columns *during* the fight of St. Privat, yet at the gigantic struggle at Sédan the rounds carried with the batteries were found to be enough.*

It is thus evident that the introduction of Q.F. field guns would complicate this already difficult question, and considerably increase the difficulties of its solution, a very grave disadvantage.

Waste of ammunition.

Though we cannot get away from the fact that, whether the ammunition be wasted or not, the increased rate of fire will increase the rate (and consequently the difficulties) of supply ; still so long as ammunition is *not wasted*, this disadvantage, with the evil consequences of running short, is somewhat lessened in view of the great and decisive results that may be obtained by the time the ammunition shall have been expended. Unfortunately experience has shown that rounds are only too often fired away without effect, even on the practice ground, and we can therefore easily foresee that there is a very serious risk of the waste with Q.F. guns on service being very large.

Increased responsibility of Commanders of Q.F. batteries

Should batteries be armed with Q.F. guns a heavy responsibility will be laid on Battery Commanders, if they waste ammunition in rapid fire at indecisive moments or without duly ensuring its full effect by careful previous ranging and verification of fuze. It is evident that they will have to exercise the utmost caution and foresight in the use of the full powers of their guns, or they will find that despite all efforts the supply of ammunition will prove insufficient to meet the expenditure.

Complication of gun and mounting.

The next disadvantage is the complication of gun and mounting which is unfortunately present in all field Q.F. equipments hitherto brought out. For rough work in the field, to cope successfully with the rattle of travel over rough roads, with the rude shocks experienced in passage of obstacles, with the wear and tear of firing, and with the deleterious effects of wet, mud and grit, it is essential that an equipment be as *simple* as possible : and I believe that no constructor has, up to the present, been able to produce a Q.F. field gun and mounting that can be called simple as compared with ordinary field equipments.

---

* Prince Kraft's "Ninth Letter on Artillery."

The gun.

To take the *gun* first. To load quickly it must have some form of single motion breech action, involving several additional parts to actuate the breech screw, and much accurate fitting of them together. To enable the layer to fire the gun as soon as he is ready—a necessary arrangement if the gun is to be really a quick firer—mechanism is required of some kind which cannot be so simple as a friction tube and lanyard. If metallic cartridge cases are used, there must be added some form of extractor to eject the fired case.

The mounting.

The *mounting* of a Q.F. gun must differ in many respects from an ordinary field carriage. In the first place it must be so constructed that after the first round there shall be practically no movement of the wheels to the rear on firing, so as to eliminate the operation of running up after each round, and to enable the layer to keep at his sights during the fire. This is effected by some sort of anchorage in the shape of a spade, or broad plate of steel, attached either to axletree or trail, and so arranged as to be automatically driven into the ground at the first round, when it takes a bearing and holds the carriage from further movement to the rear. Brakes are also added to assist. The result of this forcible holding of the carriage in a fixed position is that, on firing, an enormous stress is brought upon the structure. The stress is not so great when the spade is attached to the axletree, but is still very considerable. This entails either an otherwise unnecessary increase of weight in giving additional strength to resist the shock, or the adoption of a buffer with all its complications and liability to derangement, to reduce its violence, or both. Either of these arrangements is objectionable from the field gunner's point of view.

It must also be remembered that the spade would not act on rocky ground. Also, if under the trail, no traversing can be done with the handspike when the spade is in the ground, and this points to the advisability of providing a mechanical traversing gear on the carriage, under the hand of the layer : the quick-firing qualities of the gun as regards quick laying would certainly be improved by this addition, but it means extra weight and further complication of mechanism. It is possible however, that this traversing gear might be dispensed with, taking into account the fact that field guns have, as a rule, to be layed carefully for elevation, but only roughly for direction.

In the case of Q.F. guns mounted on board ship or in fortresses, the recoiling mass—gun and mounting—can be made very heavy, which will much diminish the violence of recoil, and facilitate its suppression with a view of increasing the rate of fire : but this cannot be done with a Q.F. field gun without either increasing the weight behind the teams, or diminishing the number of rounds that can be carried on gun and limber. Some constructors propose that extra weight shall be given to the gun and carriage, when in action, by seating two of the gunners working the gun on the mounting during firing : but the evil effects on the men during long continued firing would probably be so great as to render this method inadmissible.

We see then that we cannot have a Q.F. field gun without complications, more or less, of gun and mounting ; which imply extra weight behind teams, cannot be depended upon to act properly on service, and are not easy for comparatively untrained men to understand.

Disadvantages connected with ammunition.

Fixed ammunition.

We next come to the question of ammunition. Many of the patterns of Q.F. field equipment that have so far been produced depend for their high rates of fire on the use of fixed ammunition : and this, if adopted, would be decidedly disadvantageous in the field. First and foremost is the objection that a metal cartridge case is so much extra dead weight, every pound of which will tell on horses that are making long and rough marches daily, perhaps on very short rations; which will tell not only on the battery horses, but on those of the ammunition columns toiling forward from the parks to the front, and also from the base up to the parks; dead weight which will thus make itself felt right through the system of operations, and which in many equipments is nearly one-sixth of the total weight of ammunition to be carried.

If transported with shell and cartridge-case together forming one body, it is extremely likely that, after the equipment has had the knocking about it would get on service, the shells would be found to have been shaken or otherwise unfixed from the cartridge cases, and great delay would ensue both in getting the ammunition out of the boxes and in fixing shells and cases together again. If the metal cartridge-case must be used it should therefore be transported separate from the shell, and the gun so made that the shell could be rammed home by putting the cartridge-case into the chamber, as in heavy Q.F. guns.

Another disadvantage connected with guns made to use the metal cartridge-cases is that a "bare" charge could not be used in case of necessity, as the obturation is effected by the case. The advantage of doing away with an obturator cannot be great, seeing how compact, effectual and practical our service obturator is.

Finally, metallic cartridge cases would be disadvantageous even after they had been fired. On extraction they would fall about the breech of the gun, and after a number of rounds would form no mean obstacle to the movements of the detachment, for in rapid fire there would not be time to remove them : they form rollers under the men's feet and so would cause falls, and moreover their sharp edges cut the men's boots.

There are thus many objections to the use of a metallic cartridge-case : so many that it would be surely preferable to avoid them altogether by using ordinary "bare" charges, even at the expense of a slight loss in rapidity of service. It takes but a very slightly longer time to put in shell and charge, and it is somewhat easier to set a fuze when holding the shell by itself than when it is part of a lengthy body like a cartridge-case and shell together. Further, exactly the same ammunition could then be used for both Q.F. guns and "simple" field guns, if both were serving with an army in the field, thus avoiding confusion in ammunition supply.

Fire discipline with Q.F. field guns.

We now come to the important question of how the use of Q.F. field guns would affect fire discipline. Here again it would seem that the advantage does not lie with them, but rather with our present equipments.

Q.F. guns from their very nature demand a personnel of exceptionally high capabilities and training, if the full power of the guns is to be obtained ; and I fear that such men are not always available, and that complete facilities for such training—particularly in the form of actual practice, which is so peculiarly essential with these guns—are not readily obtainable. The training it is believed *may* be given by special efforts on the part of all concerned. But it must be borne in mind that a considerable proportion of the personnel of a battery (however good the average excellence of that battery may be, and however good its training) cannot be considered to have high capabilities; and though these men may not make much difference in the fire discipline of the battery at practice, through being kept more or less in the background, yet on service, when they will be required to replace casualties, the work will fall upon them; and the higher the standard requisite the more will the fire discipline suffer.

Of course it must be admitted that for the most part the fire discipline required of a battery armed with Q.F. guns would be the same as that expected of one using our present weapons. It is for the few brief moments when "rapid fire" is going on that higher qualities would be more particularly demanded of the former—perhaps only once or twice in the course of a fight, for two or three minutes at a time, if we exclude short series at moving targets—but *then* there is no doubt they *would* be required. To develope the full powers of the guns and to use them with success, the Battery Commander must be able to decide without hesitation when to use the full powers of the terrible weapon in his hand and, by careful observation of fire, when to stop; the Section Commanders must be more than ever all eyes and ears; the layers *must* be first-class men at their laying, the gunners at the service of their guns, those who prepare the fuzes at their fuze-setting, and those in charge of ammunition supply must be equally first-rate. All these high qualities of mind and body must be available under the stress of battle.

Loss of fire control.

It is easy to see that the personnel of a battery of Q.F. field guns would thus be very highly tried, and even the best that can be got might be found wanting. With "simple" field guns it is found, even on the practice ground, that it is not advisable to use "section fire" except at short ranges or at moving targets, as control of fire becomes lost—the fire gets "out of hand": but with Q.F. guns at "rapid fire" there would be really no control of fire properly speaking, except that the Battery Commander should be able to stop it at will. For it must be allowed that a regular fire from flank to flank, or by sections, could not be properly called "rapid fire" with Q.F. guns. For one gun to have to wait, even for the other gun of the section to fire, before firing the next round would mean that practically the guns could no longer be considered Q.F.: such a diminution in the rate of fire would entirely prevent the full development of the one great advantage in the use of Q.F. guns, and would bring the disadvantages already enumerated into a prominence which the weapons do not deserve. Each gun must, then, during "rapid fire" become a fire unit for the time, with the layer as its chief. This loss of fire control, inevitable if the fire is to be really a rapid fire, must be considered a disadvantage, but one that can be got over to some extent by special training.

Special efforts demanded of every man in a Q.F. battery to obtain success.

It will, I think, be evident from a consideration of the above disadvantages that, taken together, they imply this:—If a Q.F. equipment is to be used in the field with success very special efforts will be required of the personnel right through the batteries; increased efforts, mental and physical, will be demanded of everyone both on the line of march and in action. If we have to specify any particular men as more especially called upon to exert their utmost powers we must, I think, say that they will be those responsible for the supply and preparation of the ammunition ; but, once more, *all* will have to take a somewhat increased share of work. I think it must be admitted however that additional efforts would, as far as we can foresee, be richly repaid by great results.

II.—PRESENT Q.F. FIELD EQUIPMENTS.

What has already been done.

In discussing our subject it will be of use to see what has already been done by various manufacturers in the production of Q.F. field equipments. The subjoined tables—deduced from some published in the "Revue d'Artillerie" for September, 1897—in which the equipments are arranged in order of mobility as given by the weights behind the teams, will show in a condensed form the chief particulars of some of those produced by the best known firms at home and abroad. To each table is added, for comparison, the same information concerning the corresponding "simple" gun in our own service.

TABLE A.—LIGHT GUNS, SUITABLE FOR H.A.

LIGHT Manufactured by	Gun		Weights of Equipment (Gunners Dismounted)					Ammunition							Remarks
	Calibre in.	Length in.	Gun with fittings lb.	Gun and mounting cwt.	Limber packed cwt.	Weight behind gun team cwt.	Weight behind wagon team cwt.	Muzzle velocity F.S.	Weight of shell lb.	No. of bullets (and pieces) in shell	Weight of a bullet lb.	Weight of cartridge case lb.	No. of rounds in limber	Total No. of rounds per gun	
Canet, 1896 ...	2·95	70·9	551	14·7	10·0	24·7	—	1640	10·1	—	—	1·32	35	—	*Short*, for team of four.
Nordenfelt (Paris)	2·95	76·5	551	14·5	11·3	25·8	23·2	1476	11·0	94	—	·441	50*	197	*Light*, *2 rds. on mounting.
Cail, 1896	2·95	86·6	661	16·1	11·5	27·6	—	1722	12·3	—	—	2·2	36	—	
Maxim-Nordenfelt	2·95	72·3	542	16·0	11·8	27·8	—	1509	9·5	{ 110 } { 120 }	—	1·62	48	—	*Light.*
St. Chamond ...	2·95	82·7	772	15·9	13·0	28·9	—	1739	14·3	332	—	—	36	—	*Do.*
Canet, 1896 ...	2·95	64·9	551	16·7	12·6	29·3	—	1575	12·8	—	—	—	35	—	*Do.*
„ „ ...	2·95	94·5	728	19·3	11·3	30·6	—	1968	11·5	—	—	1·76	35	—	*Long.*
British 12-pr., 6 cwt.	3·0	66·75	715	16·25	14·5	30·75	29·25	1550	12·5	162	$\frac{1}{35}$	—	46	138	Service H.A. gun.

TABLE B.—HEAVIER EQUIPMENTS, MORE SUITABLE FOR DIVISIONAL OR CORPS ARTILLERY.

HEAVY Manufactured by	Gun		Weights of Equipment (Gunners Dismounted)					Ammunition							Remarks.
	Calibre in.	Length in.	Gun with fittings lb.	Gun and mounting cwt.	Limber Packed cwt.	Weight behind gun team cwt.	Weight behind wagon team cwt.	Muzzle Velocity F.S.	Weight of shell lb.	No. of bullets (and pieces) in shell	Weight of a bullet lb.	Weight of cartridge case lb.	No. of rounds in limber	Total No. of rounds per gun	
Hotchkiss	2·95	84·4	794	15·3	15·75	31·05	32·7	1739	13·2	231	—	·83	48	192	
Schneider, 1893 ...	2·95	98·4	750	18·3	13·2	31·5	—	1804	12·1	—	—	5·73	30	—	*Light projectile.*
” ” ...	2·95	98·4	750	18·3	13·2	31·5	—	1640	14·3	—	—	5·73	—	—	*Heavy do.*
Krupp, 1895 ...	2·95	82·7	683	15·9	15·6	31·5	—	1640	12·97	200	$\frac{1}{44}$	·99	35	—	*Light.*
Nordenfelt (Paris)	2·95	82·4	661	18·6	13·1	31·7	31·7	1640	12·97	{159 63}	$\frac{1}{37}$	·5	50*	233	*Heavy*, *2 on mounting.
Maxim-Nordenfelt	2·95	88·2	683	18·6	13·6	32·2	—	1575	12·5	{70 90}	—	1·62	36	—	*Heavy.*
Canet, 1896 ...	2·95	82·7	750	19·6	13·7	33·4	—	1706	14·1	—	—	—	35	—	*Do.*
Schneider, 1895 ...	2·95	97·0	728	18·9	15·1	34·0	39·6	1837	14·3	—	—	3·63	36	144	
St. Chamond ...	2·95	103·3	926	20·0	14·1	34·1	—	1968	14·3	332	—	—	36	—	*Heavy.*
Krupp, 1895 ...	2·95	82·7	882	18·9	16·0	34·9	—	1640	14·3	250	$\frac{1}{44}$	1·06	30	—	*Do.*
Elswick, 1894 ...	3·0	94·6	895	18·4	18·0	36·4	—	2011	12·5	180	—	—	36	—	
Swiss	3·3	84·6	937	21·6	17·3	38·9	43·7	1591	14·7	185	$\frac{1}{36}$	—	35	145	
British 15-pr. B.L. gun.	3·0	92·3	784	18·4	—	41·5	39·0	1556	14·1	210	$\frac{1}{35}$	—	46	150	Service F.A. gun.

Before giving opinions as to these figures, the principles on which those opinions have been arrived at should be stated. These are :—

Principles on which the tables will be criticised.

(a) The power of the *projectile*, other things being equal, means the effect to be expected of a field gun, and is therefore of very great importance. It must, then, be heavy enough to contain a large number of effective bullets without being so heavy as to cause excessive recoil or to seriously reduce the number of rounds that can be carried. In a new equipment, likely to be used alongside older guns in the field, the projectile should be the same as that already in use, to simplify supply of ammunition.

(b) An excessively high *velocity* imparted to the projectile is not considered desirable ; for, firstly, it brings an excessive stress upon gun and carriage in firing ; and, secondly, no time fuzes have yet been made that have no variation, one from another, in rate of burning, and the higher the velocity the greater will be the error in distance due to this variation. Moreover—according to a paper on the subject by Col. Nicholson, R.A., and Mr. Hadcock, published in the "Proceedings of the R.A. Institution" for March, 1889—the number of effective bullets from a bursting shrapnel is actually *less* with a high muzzle velocity than with a comparatively low one : this is "due to the fact that a portion of the bullets of the former start at such an angle of elevation" —due to the flat trajectory—"that they are ineffective before descending to within effective height of the ground."

All that is wanted is a muzzle velocity that will give the shell a remaining velocity at long fighting ranges sufficient to make the bullets in it effective, and no more. A base burster and heavy bullets will enable this remaining velocity, and consequently the muzzle velocity, to be considerably lower than when using a burster in the head of the shell, or small bullets. A muzzle velocity of about 1550 to 1600 f.s. is quite enough for projectiles of 12 lb. to 15 lb. weight, filled with bullets of fair size, such as about 35 to the pound.

(c) For a gun placed as it should be, as low as possible on the carriage, a *length* of more than about 8 ft. is inconvenient, as the long chase gets in the way when moving over rough ground.

(d) As *many rounds* should be carried in the *limber* as possible without increasing the weight behind the team.

(e) *Weight of gun and mounting* should be proportional to the work done on the projectile, to avoid excessive recoil.

(f) *Metallic cartridge cases should be avoided* for service in the field.

Criticism of the equipments shown in the tables.

Referring now to the tables ; it will be seen that, in all, except the two heaviest, the same calibre, 2·95 inches, has been adopted.

Taking first those in Table A, it will be noticed that the "St. Chamond *light*" equipment, fires the heaviest shell with a comparatively high velocity, while the gun and mounting are by no means correspondingly heavy : so that the recoil of this piece will probably be very violent and difficult to cope with, causing unnecessary stress on the mounting. The bullets in the shell are small, judging by their number, and will be ineffective unless the shell be burst close up. This gun however does not use a metallic cartridge case, which is in its favour.

The "Canet, 1896, *short*" and the "Maxim-Nordenfelt, *light*" patterns fire such a small shell that we need say no more about them. The "Canet, 1896, *long*" is also put "out of the running" by having such a high velocity, probably intended to increase the effect of the bullets in its small shell. It has also the disadvantage of using cartridge cases, and the gun has to be made long to obtain the velocity. The "Nordenfelt (Paris) *light*" is not so ambitious as regards muzzle velocity, but its shell is too light, though it carries a good number.

The "Cail, 1896" equipment has an unnecessarily high velocity, and uses a heavy cartridge case.

The best light equipment.

The best equipment in Table A seems to be the "Canet, 1896, *light*" firing a shell of fair weight with a satisfactory velocity : the gun and carriage together being at the same time probably quite heavy enough to allow of the recoil being easily dealt with.

Turning now to Table B, it will be best to criticize the equipments in order.

The "Hotchkiss" has a fair shell, and carries a good many rounds without loss of mobility : but the bullets in the shell are small, and demand a high velocity, to resist which the weight of the mounting and piece does not seem enough.

The "Schneider" equipments—if the figures given are to be trusted—are completely spoilt by the enormous weight of the cartridge case used.

The two "Krupp" equipments would probably give a good fire effect except that the bullets are too small : of the two the "*heavy*" is to be preferred, the "*light*" being not light enough.

The "Nordenfelt (Paris) *heavy*" is good in every respect—bullets in shell, mobility, number of rounds carried and velocity—but one, namely the use of a cartridge case ; though this latter is made very light.

Weight of gun and carriage, size of bullets, and velocity would appear to be good in the "Maxim-Nordenfelt *heavy*," but the shell is rather light and a heavy cartridge case is used.

The "Canet, 1896, *heavy*" appears to be good all round, except that the number of rounds in the limber is small.

The "St. Chamond *heavy*" is spoilt by small bullets, necessitating very high velocity, and consequently large fuze error and long heavy gun : the latter entailing a small number of rounds in the limber to keep down the total weight. The "Elswick" equipment suffers in the same way, and the shell is light in comparison with the weight behind the team : it is not clear why so few rounds are carried in the limber, seeing that our 12-pr. H.A. limber, weighing only 14·5 cwt., packed, carries 46 rounds, using shell of the same weight.

The "Swiss" gun should have very good fire effect indeed, and the recoil appears to be satisfactorily met : but the number of rounds carried is small, though the wagon is very heavy.

The best heavy equipments.

On the whole the "Swiss" appears the most satisfactory of the heavy Q.F. equipments, with the "Canet *heavy*" a very good second.

It should thus be allowable to say that Q.F. field equipments have already been produced which seem likely, when well handled, to give good results in the field ; though none can yet be considered perfect.

III.—SUMMARY.

An attempt has been made in these pages to show that the use of Q.F. guns in the field would give one indisputably great advantage, namely, a vastly increased power to crush an enemy at a favourable moment by their rapid fire, that is, a large increase in the actual power in the fight of an Artillery so armed.

The disadvantages of increased difficulty in ammunition supply, of complication of gun, mounting and ammunition, and of loss of fire control, with the additional efforts therefore likely to be demanded of the personnel of Q.F. batteries, have also been brought forward.

It may be urged as an argument against attempting to introduce a Q.F. field equipment that the present guns are good enough, being already superior in fire effect to those which were used with such success by the Germans in 1870. This may be true under present circumstances, but should some Power succeed in producing a really good equipment of the kind, and should the Artillery of that Power arrive at success in the handling of their new weapons (both apparently quite possible hypotheses), the present guns will certainly *not* be good enough when arrayed in battle against the new guns. It has been pointed out in the second part of this essay that more or less successful attempts have been already made to produce a satisfactory Q.F. field equipment, and it is believed that experiments on a large scale are in progress in several foreign countries with the object of introducing some such equipment for service with their field armies. Presumably, therefore, the Artillery authorities of those countries consider the increase of power to be obtained by the use of these guns worth striving for, in spite of the numerous attendant disadvantages. By their experiments they probably hope to overcome some of these disadvantages to a greater or less extent, and at the same time to bring out the capabilities of the new guns.

It is therefore to be hoped that we also may carry out experiments on these lines: remembering that if successful the power of our guns will be so much enhanced as to go far towards making up for the smallness of their numbers; while if others are successful and we are not, disparity of numbers may some day be increased by disparity of power into the bargain.

Experiments, and experiments on a large scale, are necessary if we wish to decide whether it is worth while to have Q.F. field guns: for there is so much to be said theoretically on both sides of the question that without some practical trial it appears impossible to answer it, one way or the other. I think it has been shown however that it *is* worth while to *try* (if we are to judge by the example set by other countries), beginning perhaps by endeavouring to obtain a Q.F. equipment for Horse Artillery acting with Cavalry, where it seems the fullest advantage is likely to be reaped. The points to be looked to and the principles it seems right to follow in the production of a suitable equipment have been given above. It is to be hoped that in this matter our motto will be that of this essay, "Nec temere, nec timide"—while we avoid rash enterprises and profit by the mistakes of others, let us at the same time have no hesitation in making trial of a form of weapon which though it doubtless has many drawbacks has as certainly much to be said in its favour.

THE SERVICES
OF
LIEUT.-COLONEL FRANCIS DOWNMAN, R.A.,
IN
FRANCE, NORTH AMERICA, AND THE WEST INDIES BETWEEN THE YEARS 1758 AND 1784.

EDITED BY

COLONEL F. A. WHINYATES, *late* R.H.A.

LIBRARY
AUG 13 1898
PATENT OFFICE

CHAPTER VI.

Actions between French and English ships. The naval and military operations in and near Rhode Island. General Grey's Expedition. Operations in the Jerseys.

August 20th, 1778.—Lord Howe, with the fleet under his command, has obliged the Comte d'Estaing, and the rebel myrmidons, the respectable allies of his magnanimous master, to abandon their design on Rhode Island, and drawn the former with the formidable squadron under his command out to sea. His Lordship on Tuesday at midnight, 12th inst., when about 15 leagues off the east end of Long Island gave the signal for action, at which time the most dreadful storm ever known on this coast at this season of the year, arose and dispersed the two fleets. It continued without intermission until the Friday following, notwithstanding which, by his Lordship's magnanimity, and the undaunted bravery of the British officers and seamen, the following brilliant actions have been performed :—

On Sunday, 16th inst., the *Zèle*, of 74 guns, a French rear-admiral's ship, bore down upon H.M. ship *Isis*, of 50, shouting and huzzaing as if she was already his capture. The French admiral at the same time hoisted his flag. Captain Raynes, of the *Isis*, in the meanwhile ordered the strictest silence to be observed, and finding that the enemy gained upon him, took every precaution to receive her properly, not permitting his men to fire till she was within pistol shot. He then gave the French admiral so warm a salute that he was soon convinced of his inability to cope with the superior and well-directed fire of the *Isis*, and there is great reason to imagine he would have struck, as he was observed to throw his papers overboard, but finding the

Isis not in a condition to follow him, he wore round, and by crowding all the sail he could carry made his escape. During the engagement, a French officer of rank, remarkably well dressed, being observed animating the sailors who had deserted their quarters, some of the light infantry on board the *Isis* took aim at and laid him flat on the deck.

Last Saturday, 15th inst., in the afternoon, about 20 leagues to the S.E. of Sandy Hook, H.M. ship *Renown* of 50 guns, Captain Dawson, fell in with the *Languedoc* of 90 guns, commanded by Comte d' Estaing, which had been dismasted in the late storm. The *Renown* immediately attacked him on the quarter and kept up a brisk and well-directed fire from 4 o'clock till dark and the *Languedoc's* flagstaff was knocked down by the first broadside. During the night she continued firing guns and making signals of distress. Next morning at daybreak Captain Dawson observed six large French ships bearing down to the French admiral's assistance, which made it prudent for him to get away. No less distinguished was the conduct of Commodore Hotham, who in H.M. ship *Preston* of 50 guns, engaged the *Tonnant* of 80, which had lost her bowsprit and foremast in the storm, raking her fore and aft for a considerable time, and would have certainly brought her in, had not some of her consorts bore down to her assistance.

LORD HOWE'S ORDER, AUGUST 17TH.

"The bravery of the officers and ship's company of the *Isis*, amongst which the volunteers from the transports, and the soldiers of the 23rd regiment, have been particularly noticed, in a late action with a French 74, bearing a flag at the mizen-top-mast head, by them supposed to be the *Zèle*[1] and the distinguished ability and resolution of Captain Raynes shown on that occasion claims from the Admiral the publick acknowledgment of their meritorious services, by which they have furnished a bright example for the imitation of the British fleet."

August 25th.—Lord Howe with his fleet put to sea from the Hook in search of the French, who are it seems returned to Rhode Island after repairing those of their ships that were damaged by the storm. The *Isis* was obliged to come up to town, as her masts, sails, and rigging are all damaged. The *Monmouth* has joined Lord Howe.

A list of the French fleet under the command of the Comte d' Estaing:—

Languedoc,	90	*Fantasque,*	64
Tonnant,	80	*Provence,*	64
Cæsar,	74	*Vaillant,*	64
Zèle,	74	*Sagittaire,*	54
Hector,	74	*Chimère,*	30
Marseilles,	74	*Engagement,*	26
Protecteur,	74	*Alcmene,*	26
Guerrier,	74	*Aimable,*	26

---

[1] It was the *Cæsar*, 74.

Besides this fleet it is reported that five French ships of force have joined him.

August 26th.—Yesterday the *Sibella,* with seven ships from Cork, arrived with provisions, after being up the Delaware as far as Reedy Island. They then took a French ship by which they learnt that the British forces had evacuated Philadelphia. So negligent are the people at home and such rebels at heart, that they did not inform the little fleet of the British troops quitting Pennsylvania.

August 29th.—It is said that the number of rebels landed on Rhode Island last Thursday amounted to 15,000 men, 5000 of which were continental troops with about 100 light horse, the remainder were the militia of Massachusetts Bay, Rhode Island and Connecticut. Their artillery consisted of 15 brass cannon, the largest of which were 12-prs. On the preceding day they advanced within a mile and a half of the front of the British lines. They began to break grounds at the distance of half a mile from Tammany Hill, a very commanding eminence well fortified, but were obliged to desist in consequence of several well-directed shells from our artillery on the Hill. Their plan of operations was to attack the lines when the French fleet returned to engage the batteries. The rebels are reported to have no less than a thousand waggons transporting provisions, etc. to their army at Rhode Island.

On Saturday last, the 22nd, the French fleet put to sea from New Port, Rhode Island, and stood to the eastward, it is supposed to Boston, to repair the damages they have sustained by the late storm, the batteries on Rhode Island, and some of Lord Howe's squadron. This day, 29th, six sail, all 74's, of Admiral Byron's fleet, arrived at the Hook. The *Monmouth* and two others are supposed to have joined Lord Howe, who is in pursuit of the French fleet. This fleet have had a dismal passage; they are all disabled in some part or other and their men are extremely sickly. Those in the worst situation are now at Staten Isle undergoing repairs and recruiting their people.

August 31st.—By express from Rhode Island, we learn that the garrison under General Pigot was in high spirits as late as last Friday, 28th, and had not then lost a man, as the rebel General Sullivan and his army had not dared venture near enough to do any mischief. A bridge of boats was thrown across from the main to the Island, but it was supposed that the *Vigilant* with her 24-prs. would be sent against it.

September 1st, 1778.—We hear that Lord Howe, having heard of the precipitate departure of the French fleet from Rhode Island, despatched the *Vigilant, Sphinx* and *Nautilus* to Newport, while he proceeded in quest of Comte d' Estaing's fleet. By a vessel which sailed from Rhode Island on Friday last and arrived here on Sunday, we learn that the *Vigilant and Sphinx* were preparing to demolish the rebel bridge over which upwards of 20,000 of them had crossed, but dared as soon eat their fingers as attack our little garrison, who are in high spirits, and entertain a contemptible idea of these invaders. It is said that the dread of having their retreat cut off operates so powerfully upon these Yankoos, that they have begun to send back their heavy artillery and baggage to the continent, and it is presumed will in a few days relinquish the expedition in their usual precipitate disgraceful manner. Those ships of Admiral Byron's squadron now arrived consist of :—

Royal Oak.—Admiral Parker.	74 guns each.
Conqueror.—Captain Colby.	
Sultan.—Captain Wheeler.	
Grafton.—Captain Wilkinson.	
Bedford.—Captain Affleck.	
Fame.—Captain Graves.	

September 2nd.—Early on Monday morning a party of 20 jägers were attacked near Valentine Hill by a body of rebels consisting of several hundreds, who killed 13 of the jägers, the remaining seven making their retreat. Immediately some troops of the new corps advanced, fell in with, and engaged a body of rebels and Indians of the Stockbridge tribe, the latter under the command of their chief Sachem Ninham, who with his son fought with desperation until a great number were killed, and the enemy then fled in the greatest confusion. Of 48 Indians only six, and of 60 rebels only eight returned. The British loss was only two killed and seven wounded. Some prisoners are taken, among them two Indians and a rebel captain. The Indian chief and his son were both killed. This action was about two and a half miles from Colonel Cortland's.

September 3rd.—It is reported that a court-martial, constituted by the rebels for the trial of their General Lee (who in some way or other misbehaved himself on the 28th June last, in the action with the British at Monmouth in the Jerseys) has sentenced him to be suspended 12 months for the *petty* crimes of cowardice and disobedience of orders !

Nothing could equal the chagrin of the Comte d' Estaing when he returned to Rhode Island after the storm, and found the garrison of Newport unmolested, and much better prepared to give him a warmer reception than before. The confabulation between him and the rebel generals was exceedingly acrimonious. They accused him of making an ostentatious parade with the powerful fleet under his command, without doing any essential service, and he retorted by affirming that after having facilitated their descent upon the Island, which they never could have done without his assistance, their prowess and valour had fallen so short of his expectations that he was reduced to the necessity of putting again to sea before Lord Howe to find a post to repair his shattered fleet.

The accounts of General Lee's conduct at the action at Freehold Courthouse are conflicting. The English affirm that Lee having been sent forward with an advanced corps of 5,000 men to attack the rear of General Clinton's army, after crossing some narrow passes across a marsh under the belief that he was only opposed by a rear guard of two or three battalions, suddenly found himself confronted in a plain by 6,000 British picked troops. As Lee considered his position, if attacked and overpowered, would have been hazardous, he retired at once before the enemy were able to form and attack him. During his retreat he met Washington with the main army advancing, who caused a stand to be made by Lee's corps supported by his own troops. Washington in his despatch to Congress dated July 1st, 1778, makes no distinct charge against Lee beyond the fact of his having retired, but states that he is under arrest.

September 5th.—We are just now informed by accounts dated August 29th, that the fleet under Lord Howe had safely effected the very difficult passage of the south channel as far as latitude 40.51. That H.M. ship *Ariel* had the preceding Wednesday taken a rebel privateer of 16 guns, carrying 18 pilots as they acknowledged to meet the French fleet under the Comte d' Estaing, and to navigate them into Boston harbour. The pilots mentioned that the *Zèle,* which the *Isis* engaged, had again found the French fleet, and that she has suffered much. The commander lost his right arm, 20 seamen were killed, and 50 wounded. When the informant left the British fleet last Saturday, Captain Hyde Parker in the *Phœnix* hoisted a signal, "four sail to the N.E.," on which the whole fleet immediately gave chase. General Hancock, the arch-rebel, writes thus to his brother rebel at Boston, August 11th: "General Sullivan intends to advance to-morrow, if the French fleet returns, to attack the next day." The French fleet did return, but neither the admiral nor their general dared risk an attack. Another rebel gentleman writes as follows: "The advance of the army is commanded by Colonel Livingstone, the right wing by General Green, the left by the Marquis de Lafayette, the 2nd line by General Hancock, and the reserve by Colonel West. The army are in high spirits and are determined to return victorious." By a vessel which left Rhode Island last Monday, we are told that the British transports that went from New York the other day through the sound with the 3rd and 4th brigades of the army, the 1st grenadiers and 1st light infantry with their artillery on board under General Clinton himself, intending for a dash on Rhode Island, from the shifting of wind to the eastward were obliged to anchor off the harbour of Newport. This occassioned a sudden adjournment of the above-mentioned high-spirited army with its wonted celerity to the continent, an insular position having ever since the Brooklyn and Staten Island affairs been deemed hazardous to the operations of *heroes thus deter-*

mined to return victorious. The particulars of this bashful business, in which the united powers of King Congress and King Louis have been employed by land and sea, I hope soon to have a full account of.

Scarce a week passes without two, three, or more French and rebel vessels being brought in here prizes to our frigates or privateers fitted out from this place.

September. 6th.—No news has yet arrived of Lord Howe. A great deal depends on him, as a good stroke struck at this juncture against the French fleet might be of service to us.

September 7th.—It is confidently reported that at the time the rebels were hurrying off from Rhode Island, General Pigot ordered a detachment out to molest them as much as possible. The detachment attacked them, and an engagement was brought on in which a number of men on both sides are said to be killed.

September 8th.—General Clinton returned to New York this morning from Rhode Island without having it in his power to chastise the insolence of the rebels landed there, for they had heard of his intention and very prudently given up their plan and all pretensions of returning victorious. The report of an action between General Pigot and the rebels on Rhode Island is confirmed by the arrival of General Clinton; the particulars have not yet transpired, but it is said the British have lost 250 killed and wounded, and the rebels 1,060. The British artillery are said to have behaved, in this as in every other affair, well, and have suffered much.[1] This is the third time Rhode Island has been attempted, and the third time the rebels have left it with disgrace. They are at a loss to find out an excuse for the failure this time, and therefore most bitterly and heavily accuse Comte d' Estaing, charging him with perfidy and cowardice. We have just got from Philadelphia the following funny report on the above subject:—

When the news arrived there that General Sullivan had been under the necessity of withdrawing the rebel army from Rhode Island, and that he attributed the same to Comte d' Estaing's having shamefully deserted them, it called to mind their former experience of the perfidy of the French nation, and occasioned great murmurings among the troops and the inhabitants in general. This coming to the ears of M. Gerard, he immediately sent the following message to Congress in order as is supposed to pacify the people:—

"M. Gerard takes the earliest opportunity of expressing to Congress the indignation he feels for the conduct of Comte d' Estaing in deserting the army of the United States in their attack upon Rhode Island, and he will by the first conveyance lay the same before His Most Christian Majesty."

A committee was formed immediately to represent to Congress the absolute necessity there was for some step to appease the *vox populi.* They pledged their honour that in case M. Gerard's representation to his king did not obtain proper satisfaction for the Comte d' Estaing's conduct, they would do themselves justice in some way or other, stop payment, change sides, and celebrate the 5th of November. The committee resolved, that the late expedition against Rhode Island was undertaken and determined on, in consequence of the Comte d' Estaing having pledged his honour to Congress that he would block up the harbour of Newport until the army of the United States should reduce the garrison.

---

[1] Lieut. W. Pemble (Kane's List, No. 503) lost his right arm on the occasion.

Resolved, "that the failure of the said expedition against Rhode Island is solely owing to the shameful retreat of Comte d'Estaing at a time when the fleet under his command was greatly superior to that of the British."

Resolved, "that M. Gerard be requested to transmit the foregoing resolves to His Most Christian Majesty, and beseech him to supersede the Count, as from his conduct, Congress cannot place any confidence in his honour."

What think you of all this nonsense? I should not be much surprised to find ere long, Congress and the French go at it hammer and tongs.

Proceedings of His Majesty's troops under General Grey, i.e. those that went to Rhode Island with Sir Henry Clinton.

General Sullivan having by a timely retreat from Rhode Island evaded the blow that was aimed at him. General Grey turned his thoughts towards New London where he hoped to surprise a number of privateers. When he arrived off that harbour, not more than three or four small vessels were discovered in it. The General therefore would not risk the lives of any of the brave followers under his command for so inadequate an object. Having anchored there for some hours in order to draw the attention of the rebels to that point, he again set sail, and in the evening of September 5th arrived off Dartmouth, the river running into Buzzard's Bay. The troops were landed immediately and proceeded to the town of New Bedford where they destroyed several vessels and many rich stores without opposition. They then proceeded to the mills above the town, where they burnt a considerable number of vessels, and having crossed the river, demolished all the stores at Fair Haven. The rebels having abandoned their fort near this last town, a party was detached to it who destroyed 11 pieces of cannon and blew up their magazine. The troops then proceeded to Sconticut Neck, where they were re-embarked by 12 o'clock on the 6th, having had only six men wounded. Above 170 sail of vessels, 70 of them large, were destroyed, and nearly 10,000 head of sheep and cattle brought from the island of Martha's Vineyard in this expedition.

September 10th.—Lord Howe and his fleet are returned to New York. Monsieur d'Estaing has escaped him and got safe into Boston. O shame! shame! upon us; what the devil are we about? At this time there are lying snug in the harbour of New York, no less than 16 ships of the line of 50 and 44 guns, besides frigates, etc. Admiral Byron with three of his have arrived at Halifax. One of his ships was dismasted in the gale and was obliged to return to England.

September 15th.—We are informed that a number of transports have arrived at Halifax from England, having on board the 70th, and two highland regiments, the Duke of Hamilton's, and the Duke of Argyle's highlanders, the former 1,000, the latter 1,100 men.

September 16th.—Admiral Byron of the Blue, in the *Princess Royal* of 90 guns, and the *Culloden* of 74, Captain Balfour, arrived off the Hook, but not getting pilots to bring them in went for Rhode Island.

Our advanced new corps at King's Bridge under Simcoe, Emerick, and Tarleton, surprised a body of 150 Virginian riflemen, killed and wounded many and took 33 prisoners, among them three officers; our loss only one horse. We are informed of a riot happening at Boston between some British and French sailors. The former were supported by some townspeople. Comte d'Estaing's son was killed and he himself wounded in attempting to quell it. Mass is celebrated in one of the churches which causes unspeakable murmurs among the conscientious people of the place. Mr. Washington has left the White Plains, the scarcity of provisions it seems having obliged him to move.

September 22nd.—A strong detachment of our army of 7,000 men under Lord Cornwallis crossed over to Paulis Hook to make an excursion. Another party from Kingsbridge of 5,000 under General Knyphausen have also gone out, and a party from Staten Isle likewise. The intention or destination of these several parties are a profound secret.

Lord Howe in the *Eagle* left this place for England. He is made a Vice-Admiral of the Red. The navy are much concerned at his leaving them. He is undoubtedly an excellent officer, notwithstanding matters have not turned out so well as we could wish respecting the French fleet.

Admiral Byron it seems is to command the fleet he brought out with him as a fleet of observation, and Gambier is to direct all naval affairs.

September 27th.—A fleet of victuallers sailed for Ireland. Governor Johnstone[1] has gone to England; he is out of the commission.

September 29th.—We have the following account from our army in Jersey. Our commander having information that 700 rebel militia were cantoned in the neighbourhood of Hackinsack, a little after 11 o'clock on Sunday night, ordered the troops to march, but two soldiers deserting gave notice of our approach, so the enemy pushed off and our intention was frustrated. However, we were more successful in another object. The 2nd light infantry, the 71st regiment, and the Queen's rangers who had passed the Hudson river at Dobb's Ferry, were engaged in it. There they fell in with the 3rd Virginian battalion, a cavalry regiment distinguished by the appelation of Washington's guards, consisting of 110, originally 180, very well appointed cavalry with extremely good horses. Our troops dashed upon them with their bayonets to such effect, that only three of their corps escaped. Sixty including five officers were killed, with a number as yet unknown of the militia. The prisoners consist of 50 Virginians, many of whom are wounded. Colonel Baylor, their commander, is mortally wounded and left on his parole. He wrote to General Washington, "that he was very much mortified in being obliged to acquaint him that his whole regiment was killed or taken by the British." All their horses, accoutrements, etc. are brought in, with 300 head of cattle, a great number of sheep, etc.. The action happened near Tappan. The British did not lose a single man. Rebel officers prisoners.

---

[1] Governor Johnstone, who had been a strenuous advocate in the British Parliament for the rights of the Americans, was accused of trying to bribe members of Congress by means of private letters, he therefore resigned.

Colonel Baylor, } Mortally wounded.
Major McLeod, }

Captains Swan and Crane, Lieutenant Randolph, Cornet Fitzhugh, Ensign Gilchrist, Messrs Dale, Evans, Vanbrugh, Shutliff, and Kitty.

The following correspondence has passed between Sir Henry Clinton and the American Congress.

New York, September 19th, 1778.

To His Excellency Henry Laurens, Esq., President, and other members of the American Congress at Philadelphia.

SIR,—

Nothing but His Majesty's positive instructions, of which I send you an extract, would have induced me to trouble you or the American Congress again on the subject of the troops detained in New England, in direct contravention of the treaty entered into at Saratoga. The neglect of the requisition already made on the subject is altogether unprecedented among parties at war. I now, however repeat the demand that the convention of Saratoga be fulfilled, and offer by express and recent authority from the King, received since the date of the late requisition made by His Majesty's commissioners, to renew in His Majesty's name all the conditions stipulated by Lieut.-General Burgoyne in respect to the troops serving in America.

In this I mean to discharge my duty not only to my King whose orders I obey, but to the unhappy people likewise whose affairs are committed to you, and who I hope will have the candour to acquit me of the consequences that must follow from the new system of war you are pleased to introduce.

I have the honour to be,
Sir,
Your most obedient and most humble servant,
H. CLINTON.

Please to observe the answer from these insolent scoundrels.

To his Excellency General Sir Henry Clinton, K.B., etc., etc., New York.

Philadelphia, September 28th, 1778.

SIR,—

Your letter of the 19th was laid before Congress, and am directed to inform you that the Congress of the United States of America make no answer to insolent letters.

I am, with due respect,
Your obedient humble servant,
CHARLES THOMPSON,
Secretary.

A remonstrance had already been made by the commissioners to the Congress on August 7th on the subject of the violation of the Saratoga convention. It is undeniable that Burgoyne's army was treacherously detained three years in America in direct infringement of the agreement entered into between Generals Gates and Burgoyne. These troops were kept a year in or near Boston, then marched a distance of 600 miles to Charlottesville, at that time a village in the back woods of Virginia, and they were subjected to most ungenerous and vindictive treatment.

October 10th, 1778.—The *Raleigh* frigate (rebel), Captain Barry, of 32 guns and 255 men, was sent into New York by H.M. ship the *Experiment*, Sir J. Wallace commander, and the *Unicorn*, Captain Ford. She was discovered in Boston bay at 8 o'clock in the morning of the 26th September, when after a chase of eight hours the *Union* engaged her, and the first broadside carried away the rebel foretopmast and main-top-gallant-mast. The action continued till 10 o'clock. The *Experiment* coming up received a broadside which was instantly returned, and the rebel finding he could not escape, ran his ship aground on Sale Island, and made his escape in his boats with 102 of his men. Sir James Wallace has taken and destroyed no less than 16 armed vessels in his last cruise. The inhabitants of Boston applied to Monsieur d'Estaing desiring he would clear the bay of English ships, but Monsieur answered that he had no intention to divide his fleet, and that as soon as he was properly fitted, he intended to proceed to sea to fulfil the orders of the king his master.

Flour is so scarce in and round Boston, that the rebels are obliged to employ an immense number of waggons to convey it from all parts of the continent, at an enormous expense, to supply their great and good allies, the rascally French.

October 12th.—General Washington and his army are now in and about Peek's Hill, Fish Hill and Danbury.

An action happened on July 27th, 1778, off Ushant between the English fleet under the command of Admiral Keppel, consisting of 30 ships of the line, and the French fleet under the command of Comte d'Orvilliers of 32 ships of the line. The English had 133 men killed, three lieutenants, and 373 wounded. By most accounts, the French lost very considerably both in officers and men, it is said 3,000 killed and wounded. They ran away in the night and got into their own ports. When did it happen before that 30 British ships of the line engaged the same number of French and not one vessel was taken or destroyed? Wonderful! Passing strange! No war was declared at the time.[1]

A manifesto and proclamation has been sent by the British commissioners to the Congress and to the 13 states of America offering terms to be accepted within 40 days from the 3rd October, 1778. Everything is offered to the rebels they can desire but independence; if they neglect these fair proposals, the commissioners are to return to England, and the country I hope will be laid waste from stem to stern.

October 22nd.—Some little time ago, a small detachment of H.M's ships, two galleys, and four armed vessels under the command of Captain Collier of the *Zebra,* having on board 300 men commanded by Captain Ferguson, sailed from hence for Egg harbour, where after surmounting some difficulties in passing into the harbour, they destroyed 11 sail of vessels, among them a very fine ship, and others of considerable size. The troops being landed proceeded to destroy the settlement and store houses of the committee men and of every person notoriously known in the piratical vessels which have greatly annoyed the English. The salt works on the bay were also effectually destroyed. Captain Ferguson being informed that 600 rebels with four pieces of artillery were coming to attack him, determined to surprise them. Accordingly 250 men were landed on Mincock Island, and at 4 o'clock in the morning he passed the bridge undiscovered, and surrounded three houses in which the infantry of Pulaski's[2] legion were posted. These were instantly charged with the bayonet and 60 of them put to death on the spot, amongst them a Lieut.-Colonel, two captains, and four or five other officers. Ferguson only lost one man killed and one wounded. They embarked on board their ships, and soon after arrived at New York.

October 25th.—French ships are sent in here almost every day, prizes to our men-of-war and privateers. A cartel is settled between here and Boston, and many prisoners have already been exchanged. Those artillerymen taken in the *Thunder* bomb and tender have arrived at New York.

---

[1] It appears that the state of the wind and position of the respective fleets prevented Admiral Keppel bringing the French, who were unwilling to join battle, to a decisive action. There was also some mistake in our fleet in complying with the Admiral's signals. He and Vice-Admiral Sir Hugh Palliser, Bart. were tried by courts martial, the former for misconduct and neglect of duty, the latter for misconduct and misbehaviour, but both were acquitted.

[2] Count Pulaski was killed in the unsuccessful assault made by the American and French troops at the siege of Savannah on October 9th, 1779.

(*To be Continued.*)

THE MECHANISM OF BICYCLES.

ILLUSTRATED BY
SPECIMENS AND DRAWINGS.

BY

MAJOR S. B. VON DONOP, RA.,
Professor of Artillery at the Royal Military Academy.

(*A Lecture delivered at the Royal Artillery Institution, Woolwich, Thursday, 10th March, 1898.*)

C. V. BOYS, ESQ., F.R.S., IN THE CHAIR.

THE CHAIRMAN : I will ask Major von Donop to give his lecture on "Bicycles and their mechanism."

MAJOR S. B. VON DONOP, R.A. : Mr. Boys, ladies and gentlemen. No apology, I think, is necessary for bringing the subject of bicycles before any audience owing to the very large number of people who are now in the habit of riding them daily either for health, pleasure, for the saving of time or exertion, still I feel somewhat diffident in being the one to bring the subject forward, especially in the presence of such an audience which includes many who have been able to bring greater ability and greater scientific skill to bear upon it. I allude particularly to the chairman, who is an expert in this as in many other matters, and I consider that he has done a great honour to me and also to the Royal Artillery Institution in coming down to take the chair this evening. As long as our rules have permitted it, Mr. Boys has been one of our special honorary members.

My intention is to first of all deal with a few points which are common to the riders of all forms of machines and then to bring before the notice of those who are not in the habit of going to the annual Bicycle Shows just a few of the many different varieties of driving mechanisms that are to be met with, and before I go further, I would ask you to allow me to add to my own your thanks to the many firms and gentlemen who have so kindly placed these interesting machines at our disposal this evening.

In what I have to say about the various machines, I would ask you to bear in mind that I am influenced by two things; the first is that feeling that I am much indebted to the various owners for the loan of their machines, I do not think it would be fair, on my part at any rate, to condemn portions of their mechanism which might appear at first sight to be unsatisfactory, without having first given them a thorough trial; some were certainly sent in time for me to try, but the trials were not very satisfoctory owing to my apparently not being (to use a lady's shopping expression) "stock size," and it is useless trying a machine if it does not fit you.

The second thing is that it was stated in this theatre about five weeks ago that bicycle companies are extremely fond of litigation. *I* am *not.*

I must remind you that all the gear cases have been taken off the machines and in certain cases diagrams are printed in order to show the parts more clearly.

A bicycle is a machine arranged so as to evolve 'work' from the power received into it from the weight and muscular action of the rider and to transmit this work again by conveying the rider and the machine along the road.

From the fact that a certain amount of the force applied in any machine is absorbed by the machine itself, owing to friction, etc., the work transmitted is always less than the work received.

$\frac{\text{Work transmitted}}{\text{Work received}} = E$, E being the co-efficient of performance, or the efficiency of the machine which is always less than unity varying from a low percentage, say 25 °/o as in some locomotives, to possibly 98 °/o, and it may be interesting for you as bicycle riders to know that I am corroborated by good authority when I say that it is believed that a higher efficiency is obtained from a well made bicycle than from any other piece of machinery that has yet been invented.

Various forms of mechanism and chains are often stated to give from 20 to 40 °/o extra power, that is to say assuming that from 2 to 5 °/o is lost by friction the rider can get more work *out* of the machine than he puts *in*! ! a fact, which if correct, would not only help bicycles but would revolutionize the whole of the machinery in the world and make the fortune of the happy inventor.

Before examining the devices employed for utilizing in the most efficient manner the power exerted by the pressure of the foot on the pedal, it is well to look very briefly at the resistances to be met with when riding. Opinions of experts who have carried out experiments seem to differ somewhat on the formulæ by means of which the resistances can be calculated, so that I hesitate to place any before you, but in one or two instances I do so, more for the purpose of showing the influence that certain weights, dimensions, speeds, etc. have than for calculating the exact resistances.

The first resistance R_1, common to all wheel vehicles, is that known as resistance to rolling and the formula that we shall perhaps be safe in using is $R_1 = \frac{W}{R} C$ where W = pressure normal to the road (on level roads = weight of machine + weight of rider.)

and C is a constant depending upon the nature of the road and the form of tire both as regards its resilience and its air pressure, and it is stated that experiments show C to have been reduced by pneumatic tires to one-half what it was with non-elastic tires. The value of C may be roughly taken as follows :

On asphalt or wood...... C = ·06
Good road.................. C = ·2
Fair road .... C = ·4
Poor road.............. ... C = 1·2

The second resistance R_2 is that offered by the air and the formula used at the Greenwich Observatory may be taken as a guide.

$$\text{It is} \quad R_2 = \cdot 003\ V^2\ A.$$

where A is the mean plane surface offered to the air, but in the case of such a complex body as a bicycle and rider and owing to the action of the spokes in cutting through the air, it is believed that A requires to be multiplied by some co-efficient less than unity. V represents the sum of the velocities in miles per hour of the machine and of the wind if riding *against* the wind and the difference of the two if riding *with* the wind.

It may be mentioned that a high wind blows from thirty to thirty-five miles an hour, a storm fifty miles and a hurricane eighty miles.

Although not recommended for ordinary riding, it is easily seen why the 'scorcher' and racer bend over the handles, for by so doing they diminish the factor A to a considerable extent. We also obtain an explanation of the fact that has no doubt been apparent to many riders that the faster one goes down a hill (with the feet on the pedals) the more power one has in back pedalling.

I do not think it would serve any purpose to give a formula for R_3, the resistance due to the friction of the ball bearings, chain and sprocket wheels, but I have the results of two entirely independent series of experiments before me. One series carried out by Professor Goodman, of the Yorkshire College, Leeds, from which he finds that about 2 °/₀ is lost by R_3, thus making the co-efficient of efficiency 98. (This is, of course, for a well made machine in good condition and properly lubricated).

The other series was carried out by Professor Carpenter, of the Cornell University, and from the results it is seen that the highest efficiency obtained in the case of a chain-geared machine was 97°/₀, the friction of the chain itself being shown to vary from ·8 °/₀ to 2·5 °/₀. Professor Carpenter also found that the friction of the chain was independent of the speed. The efficiency of chainless bicycles was somewhat less, but in their case the co-efficient of friction decreased as the speed increased, so that the effort of propelling a geared machine at low speeds, as in hill climbing, was relatively greater than that of propelling a chain machine. He also found that the total friction increases but the co-efficient of friction decreases with an *increase of load* for both kinds of machine.

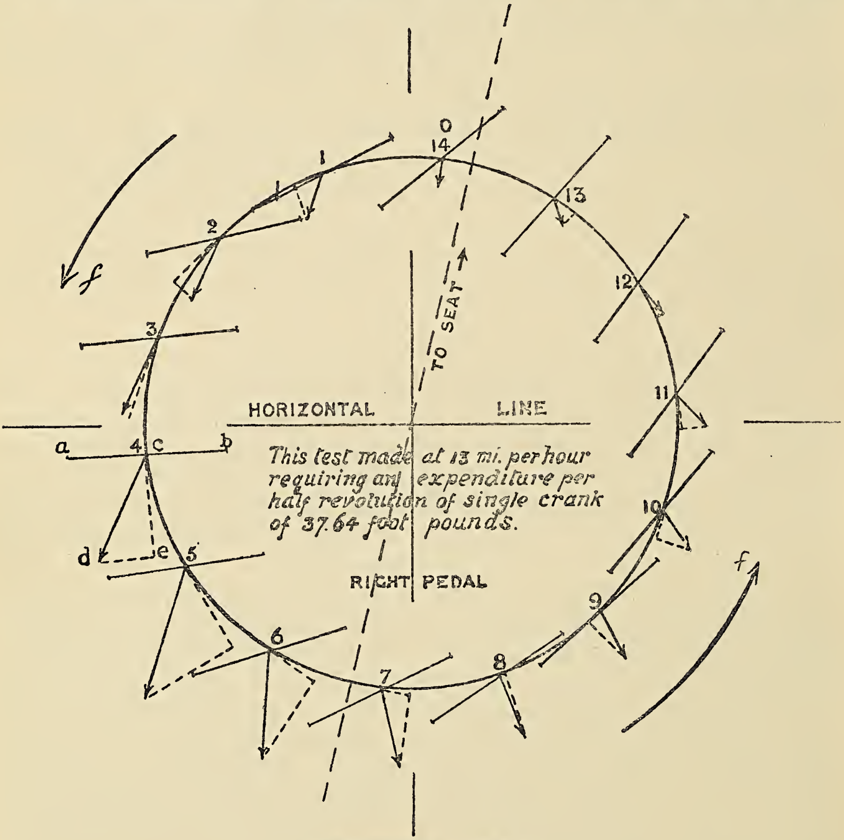
There is a resistance due to vibration which may be neglected if all the parts such as mud guards, brake, etc., are firmly attached and the machine is of such a weight that the frame is suitable for the weight of the rider and the nature of road usually met with.

There appears to be a desire on the part of many riders to obtain a very light machine, but if the machine is required for all round riding it should be remembered that after a certain point is reached, this saving of weight is only obtained at the expense of strength, rigidity and durability. What will do for a racing track will not be suitable for climbing a hill or riding on the Woolwich roads. The only remaining resistance is that due to the gradient and the formula.

$$R_5 = W\frac{h}{l} \qquad \text{(where } h = \text{rise, } l = \text{length of road)}$$

is the same for bicycles as for all other bodies. When going down hill, R_5 of course acts *with* the rider instead of *against* him.

I have reproduced a diagram (published by Mr. Landis in the *Scientific American*) of the analysis of the pedal pressure which was obtained by some experiments carried out by Mons. Bonny in Paris.



This test made at 13 mi. per hour requiring an expenditure per half revolution of single crank of 37.64 foot pounds.

Diagram "A."

The velocity was 13 miles an hour and the work was measured by a pedal of special construction containing two dynanometers so as to register the power exerted in two directions at right angles to each other. The tangential and radial pressures are shown by the dotted lines, the former, however, are the only ones that are transmitted to the driving wheel, the latter being merely uselessly expended on the crank shaft bearing. The lines *a b* represent the position of the pedals and *c d* the resultant pressures.

The diagram is very useful in illustrating the magnitude of the tangential pressures at 14 different points on the pedal path. It will be noticed there is a back pedal pressure from the position 9 to 13. This, however, must not be looked upon altogether as *lost* work, as a large portion of it is expended in raising the foot, work that would otherwise have to be done by the rider drawing the foot up. Work very fatiguing as will be readily remembered by those ladies and gentlemen who have had a turn on a treadmill. Where it appears to me that the diagram does not faithfully illustrate the action of pedalling of an ordinary road rider, is that it apparently represents the heel considerably raised at the top position, and therefore without any tangential component at that point, whereas most riders (with rat-trap pedals) will, I think, agree in saying that by sinking the heel a considerable tangential component can be obtained to help in getting the pedal over the top dead points of the crank circle just as a clawing movement aids in passing over the lower dead points, but it must be remembered that most probably the tests were carried out on a racing machine in a racing attitude, *i.e.*, bending over the handles, the saddle well forward, as the tangential components at the lower portion of the circle (7 to 8) indicate.

The most effective pedal pressure when encountering a hill or wind resistance is obtained by making the tangential pressures as even as possible.

A word will suffice to explain how the invention of the pneumatic tire has revolutionized almost everything in the bicycle world. With a solid tire each obstacle met with not only brought a severe blow upon one particular spot on the machine, but the machine and the rider had to be lifted over the obstacle, entailing in the course of an afternoon's ride a vast expenditure of work. A pneumatic tire on meeting an obstacle yields to the pressure, the shock due to the blow is distributed over the whole wheel through the compressed air, while the machine and rider are not appreciably raised. A wider surface of contact is also obtained, the tire flattens instead of sinking into soft ground. This lessening of the shock has done more than anything else in reducing the weight of machines. From the results recorded on the racing path it appears that even on a smooth track the elasticity of the tire adds very considerably to the speed attained.

The question of excessive knee action is one that often is discussed by bicycle riders, and it is a point which, I imagine, concerns ladies perhaps more than men. It is affected chiefly by the position of the

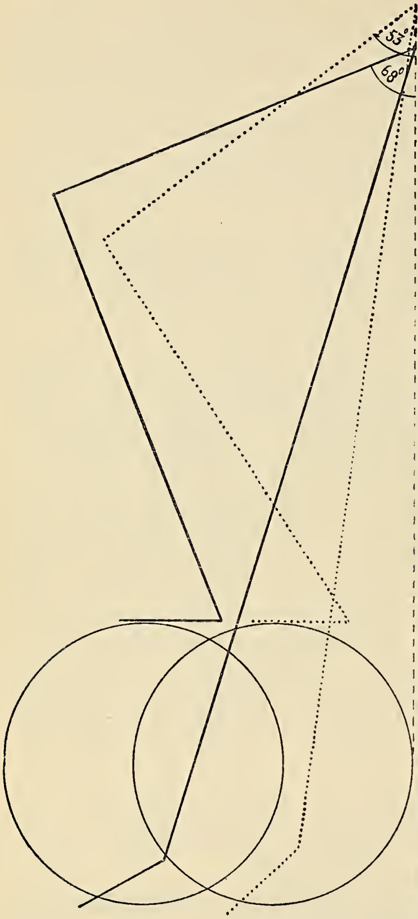


Diagram "B."

saddle. It is easy to understand that if the saddle is placed so low that the leg is still bent when the pedal is at its furthest position from the saddle, high knee action will be observed at the highest position of the pedal. But also the forward or back position has a great influence that will be understood by referring to the diagram, which shows the position of the knees in the two cases, first when the saddle is placed immediately over the back centre position of the pedal and secondly when placed six inches further back. To compare the action, I have drawn the pedal path of the second case six inches further to the front so as to leave the saddles on the same vertical lines. It will be seen that the angular movement of the upper part of the leg is 53° in the first case and 68° (or 15° more) in the second. With the forward position also the vertical jolting due to the back wheel going over a stone is diminished. When sinking the heel there is still less knee action.

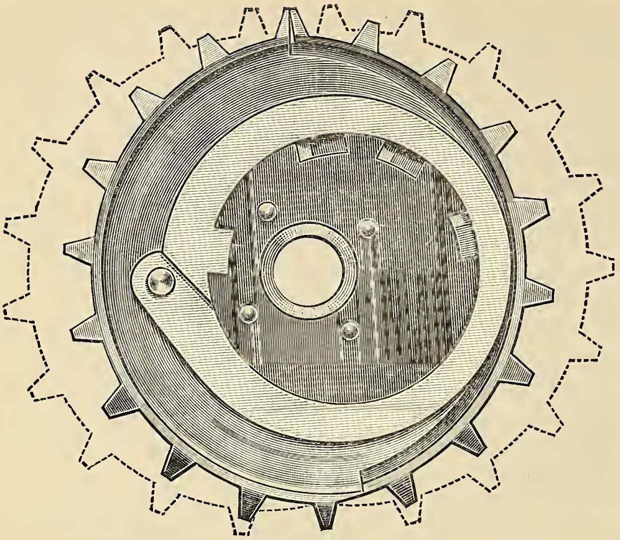
The driving mechanism which I propose to speak chiefly about this evening is the method by which the power applied to the pedals by the foot is utilized in driving the machine along the road.

The method usually employed consists in keying to the same shaft as the pedals a sprocket wheel, a smaller sprocket wheel being attached to the hub of the hind or driving wheel, and the two sprocket wheels are connected by a sprocket chain. If the two sprocket wheels were the same size, then for one revolution of the pedals the machine would move a distance equal to the circumference of the driving wheel, but with the usual sized wheel, of 28 inches, this movement would be too small, so it is customary to "gear" the machine in such a way, that while the pedal revolves once the driving wheel revolves twice, three times, four times, or any fraction of these numbers, according to whatever leverage is most suitable for the rider. If the wheel (of 28 inches) revolves twice, it is said to be geared to 56 since the distance that the machine would travel, for one revolution of the pedals, would be equal to the circumference of a wheel 56 inches in diameter. This way of estimating the gear was used when first the safety bicycles were produced, in order to give those who had been in the habit of riding the high machines (where the pedal cranks were rigidly attached to the high wheel) some idea of the travel of the new machine for each turn of the pedal and the consequent power required; for the connection between the pedal and the driving wheel and consequently the gear is entirely a matter of leverage. For the same length of crank and the same sized wheel just twice the power must be applied to overcome the rolling resistance of a machine geared to 112 as that required for a gear of 56. It should be noted, however, in connection with this, that, owing to the fact that it is found to be impossible to make more than one and a half complete revolutions of one foot in a second, a bicycle required for high speeds such as are required on a racing track must be geared high. It seems superfluous to remark that the simple way to finding out the 'gear' of any machine is to multiply the diameter of the driving wheel by the number of teeth on the large sprocket wheel and divide by the number of teeth on the smaller sprocket wheel.

While looking at this machine (Martini) made by Mr. Hardy, a bicycle maker, for whose introduction I, in common with others in this room, owe a debt of gratitude to Colonel Watkin, it might be noticed that the top stay is made in two pieces so that if required for a lady it can be unfastened and the ends folded out of the way. The joint (invented by Mr. Liebenrood) is on the differential screw principle. The connecting piece is provided with female screw threads at each end, which screw off and on the hind and front portions respectively of the stay when the connecting piece is given a right-handed turn. The threads at each end are of different pitch, that on the hind portion being 16 threads to an inch, that on the front being 14 to an inch, consequently with one turn the connecting piece moves *off* the hind portion $\frac{1}{16}$ inch and *on* to the front portion $\frac{1}{14}$ inch, with the result that the two portions of the stay are made to approach each other and each turn of the connecting piece brings them into great tension and gives the stay greater rigidity.

Though not required by the ordinary rider this adjustment appears to present a decided advantage for certain cases—*first* where a machine is required to be ridden by either a lady or gentleman; it is not treating a lady's bicycle fairly for a gentleman to ride it without this additional strength, *secondly* for those who hire out machines and *thirdly* in the case of mixed tandems so as to allow either the gentleman or the lady to ride in front.

There appears to be a demand on the part of a number of riders to have a machine, the 'gear' of which can be altered at will without stopping, so that a high gear can be used when on the level and a low gear obtained when a high wind or a hill has to be encountered. The 'Protean' geared bicycle is constructed on this principle, it being possible to employ one of four different gears as required. The arrangement is as follows:—There are two sprocket wheels and a chain. The small sprocket wheel is not however *fixed* to the hub of the driving wheel, but is in the form of an annular ratchet wheel,



Protean.

i.e., it has saw-shaped teeth projecting inside, while the hub has attached to it four small pawls, the ends of which are kept pressed against the annular wheel by light springs so that it is only when the pedals are being worked with a forward movement that the sprocket wheel drives the hub and consequently when the pedals are kept stationary the wheel can still run on, the pawls merely slipping over the teeth. This is known as a "free wheel" arrangement. In the machine before us the large sprocket wheel has 18 teeth and the smaller one 8, consequently with a 28″ wheel it is geared to 63. The large sprocket wheel is made in two portions in such a way that by a back pressure upon the pedals the two portions expand, and although no fresh teeth come into play (except that one tooth becomes two teeth) the perimeter of the wheel is lengthened a distance equal to the pitch of either one, two, or three teeth with a consequent change of gear of 63-66-70 or 73.

The sprocket wheel at its smallest, *i.e.*, 18 teeth is slightly oval, with 19 teeth, a circle and with the equivalent of 20 and 21 teeth an oval. When the sprocket wheel is elliptic in shape the foot will not have an even velocity of rotation. This is stated by some to be a serious drawback, others who have ridden the machines maintain that not only is no inconvenience caused but it is difficult even to detect the irregularity.

To obviate the difficulty caused by the slackness of the chain at the smaller gears, a small sprocket pinion of celluloid is kept pressed down by a light spring against the lower return of the chain. This is a disadvantage, as obviously extra friction and vibration must be introduced.

Only a practical trial, extending over a long period, can prove whether this and many of the other forms of mechanism brought to notice give satisfactory results as regards the friction, vibration, wear and tear of parts and power to withstand the action of the mud, rain and dirt.

Personally I am very much opposed to a free wheel attachment, owing to the power of back pedalling being taken away. I feel sure the majority of riders will call to mind occasions when it has been of the greatest convenience, to say the least of it, to back pedal either supplemented by the use of the brake or not. It is also inconvenient not to be able to wheel the machine backwards. In justice to the makers I should tell you that they provide each machine with a powerful rim brake, the details of which want of time prevents my going into on this occasion.

The Northfleet gear resembles the Protean insomuch that it has a free wheel and also changes of 'gear' are admissable, but the mode of carrying out these two principles differ. The free wheel is worked by a friction clutch instead of a ratchet. There is no chain or sprocket wheel. The pedal cranks are each connected with arms inclined at about sixty degrees and so form two bell crank levers. To the arms on which the pedals are not attached, and which we will call the counterlevers, are attached the ends of wire rope formed of four strands of piano wire. On leaving one counterlever the wire passes nearly twice round an eccentric pulley on the friction clutch on one side of the wheel, thence round a pulley attached to the bottom bracket and back again to another eccentric pulley on the other side of the wheel and from there to the other counterlever. The pedal cranks do not revolve through a larger angle than about 90° and so the feet have a reciprocating motion up and down through an arc, and since each eccentric clutch only actuates the wheel in one direction, as one pedal is pulling on the wire and moving the eccentric clutch the other pedal is being pulled up into the position required for the next stroke. Now for altering the gear it will be seen that the ends of the wire can be attached to the counterlevers at any of five positions. If attached close to the fulcrum, greater leverage will be obtained, but at the loss of speed since the end of the wire moving over a shorter *length* of arc the driving wheel will be turned less than if the wire were attached further away from the fulcrum. The five positions represent gears of from 40 to 100. The wires are attached to the counterlevers by rollers and pawls which fit into slots in the arms; these pawls can be released and the rollers moved from one to any other position by pressing a pneumatic button on each handle in turn.[1]

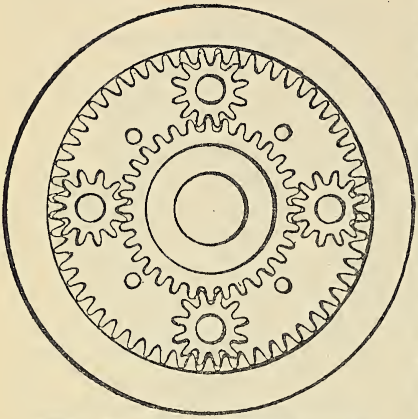
For a long time many endeavours have been made to do away with the chain, it being held by a certain number of people that it has great disadvantages in requiring adjustment, difficulty of lubricating, keeping it clean and the increase of friction when it gets dirty, all disadvantages no doubt; but public opinion, in the form of the majority of the riders met with, still appear to cling to the chain apparently preferring to put up with or combat, more or less successfully, with the drawbacks enumerated than to use any of the chainless machines which have been put before them.

One of perhaps the best known chainless safety bicycles is that called, presumably from its size, the Bantam. This is a front driver, and as far as the mechanism is concerned it is no doubt very neat and com-

---

([1] The machine was ridden by Captain Crampton on a "home trainer" and the action of changing the gear exhibited).

Diagram "E."



The Bantam Mechanism.

pact. There are some two or three varieties but the principle in every instance is very similar. There is an annular wheel attached to the front fork in such a way that it cannot move ; inside this wheel is a spur wheel which is attached to the hub of the front or driving wheel, gearing into both of these wheels and fitting in between them are four small pinions placed equidistant from each other, free to revolve on their axles, the latter fit into a flange to which are also keyed the two pedals and the spindle joining them. It will thus be seen that the motion of the driving wheel is obtained by turning the pedals and consequently making the four pinions run round the fixed annular wheel. The figure shews the arrangement for a gear of 66 with a driving gear of 24 inches (a feature of the machines being their small wheels).

The small size of the wheel though causing a diminution in the weight increases the rolling resistance and also increases the shock and vibration caused by contact with loose stones in the road.

The chain friction is no doubt avoided, but in its place we have the friction of the axles carrying the pinions and they are not on ball bearings.

I have heard rumours that the Bantam machine has a tendency to kick going down hill, a vice to which the old high machine was very much addicted.

The Crypto machines are worked on a similar principle, the wheels being from 32″ to 36″ in diameter.

The Bantam machines can now, if required, be procured with wheels 26″ in diameter.

Other chainless machines are those fitted with bevel gearing, the best known being the "Acatène." In the place of the sprocket wheels there are two bevel wheels, each of them gearing into another bevel wheel attached at either end of a hollow shaft which rotates on ball bearings round the back stay of the machine. Thus the motion is conveyed from the pedal to the driving wheel. *See* diagram *F*.

The back wheel does not require to be adjustable but is fixed to the fork by screws.

In some other makes of bevel gears, small rollers have been substituted for the ordinary teeth on one of each pair of wheels in gear, but it is an open question whether any friction is saved thereby.

The neat appearance of the Acatène is apparent to all, but the drawback to all bevel gearing appears to lie in the fact that in order to obtain true running, i.e. with the least possible rubbing friction between the teeth, it is absolutely essential that the vertices of the cones of which the pitch surfaces of the bevel wheels form the frusta, should coincide at a single point. In all machines there is liability of the frame to get slightly distorted either by an accident or by excessive pressure, and in that case great friction and spreading away of the wheels would ensue.

The Acatène Company assert that they can insure the necessary rigidity.

I believe that one is apt to feel a tingling sensation through the legs owing to the engaging of the teeth, and no doubt the success of this machine will depend in a large measure upon the accuracy attained in the cutting of the teeth and upon their durability.

The Quadrant machines fitted with Lloyd's cross roller gear resemble somewhat the bevel gearing. Instead of a pair of bevel wheels at each end of the shaft there is a pair of wheels with pegs projecting at right angles, and on the pegs are rollers of hard steel. *See* diagram *G*.

It is claimed by the makers of this mechanism that all spreading away of the wheels is avoided and that the minimum of friction is reached. Whether this is correct or not, only exhaustive experiments carried out with working loads and velocities can prove, the spinning of the wheel free of the ground cannot be accepted as a test of the efficiency.

Certainly with this machine the pressures in driving act in a direction normal to the road and this must be looked upon as a decided advantage.

Changes of gear can be effected in a few minutes by putting different sized wheels on the back hub.

There appears to be a general opinion that both the Acatène and the cross roller reply to the foot pressure in starting much more quickly than a chain geared machine. There is also less back lash.

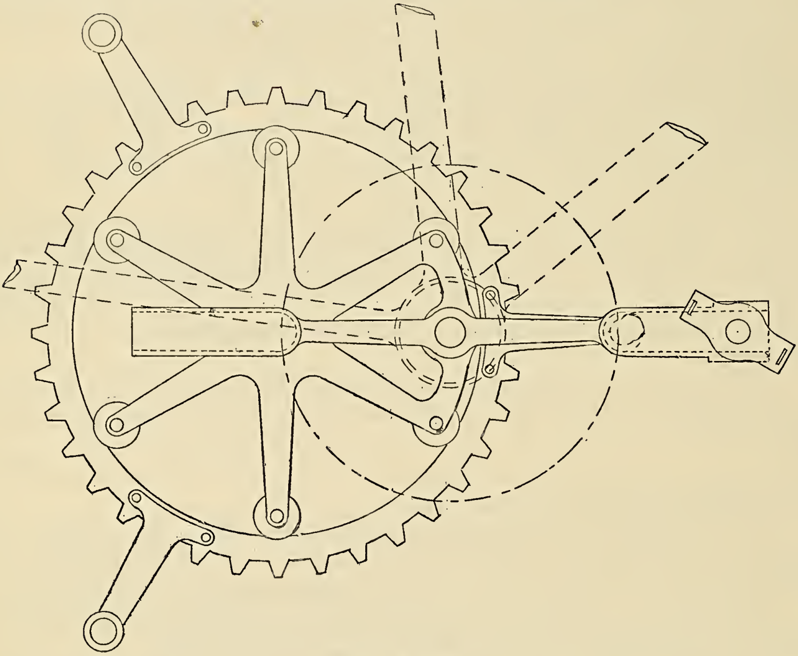
A point to be noticed in support of the Acatène and cross roller gears is in connection with the strain on the hind axle.

In a chain machine the load due to the weight of the frame and the rider is increased considerably by the pull of the chain in hill climbing, this pull acting at right angles to the load pressure. In the other machines this increased pressure acts upwards, tends to lift the frame and rider, and so *decreases* the pressure instead of increasing it. In the cross roller gear this lifting movement is more nearly vertical than in the bevel gear. It must be confessed, however, that part of this saving is lost again at the crank shaft bearing.

TURNBULL'S.—This form of mechanism is interesting to many of us not only from the ingenuity of the invention, but also from the fact that Mr. Turnbull, the inventor, lives not more than one hundred yards from the Arsenal gate.

The machine is one of the class for which it is often claimed that extra power of leverage is obtained without the loss of speed. Mr. Turnbull, I am glad to say, admits that extra power is not obtained.

The crank on the 'off' side of the machine is double ended, having the pedal at one end, and, in addition, at each end a groove about three inches in length, about $\frac{3}{4}$ inch wide, and open at the end. The pedal on the near side is keyed to a spindle joining it with the "double crank." The sprocket wheel, which rotates on a fixed spider wheel provided with six rollers, has on it three arms, at angles of 120° with each other, each fitted with a roller and each of these rollers in turn comes into contact with the grooves on the double crank. In this way each pedal in its downward half revolution turns the sprocket wheel through an angle of 120°, aud it follows that the pedal rotates three times while the sprocket wheel revolves twice.



Turnbull's.

The result of this arrangement is that instead of the simple lever of the crank and large sprocket wheel we have a compound lever—the two levers being the crank and the distance between the end of the arm and the centre of the sprocket wheel, the two counterlevers being the distance from the crank spindle to the point the roller is in contact with the groove and the radius of the sprocket wheel.

From what has already been said it is impossible to obtain extra power except at the loss of speed and consequently I was unable to agree with the statement originally put forward that "a greater leverage on the down stroke amounting to 38°/$_0$ on a $6\frac{1}{2}$ inch crank is obtained."

To some it may appear that extra leverage, due to the arms projecting outside the sprocket wheel *is* gained, but on examining the diagrams it will be seen that the tangential component of the foot pressure does not act in a direction tangential to the rotation of the sprocket wheel except when the pedal is horizontal and therefore it is not *O A* which appears at first sight to be the lever, but *O D*.[1]

By drawing the combination of levers to scale in seven positions, i.e. with crank vertically up and down, horizontal and in four positions midway between them I found the power gained with a 10″ sprocket wheel was

(1.)	$\frac{5}{6\cdot5}$	(2.)	$\frac{5}{9\cdot5}$
(3.)	$\frac{5}{12}$	(4.)	$\frac{5}{13}$
(5.)	$\frac{5}{12}$	(6.)	$\frac{5}{9\cdot5}$
(7.)	$\frac{5}{6\cdot5}$	—	

which gives an average of $\frac{5}{9\cdot85}$; the denominator, however must be multiplied by $\frac{2}{3}$ in order to compare it with the ordinary chain gear and the result will be that the same mean average $\frac{5}{6\cdot5}$ is obtained in each case.

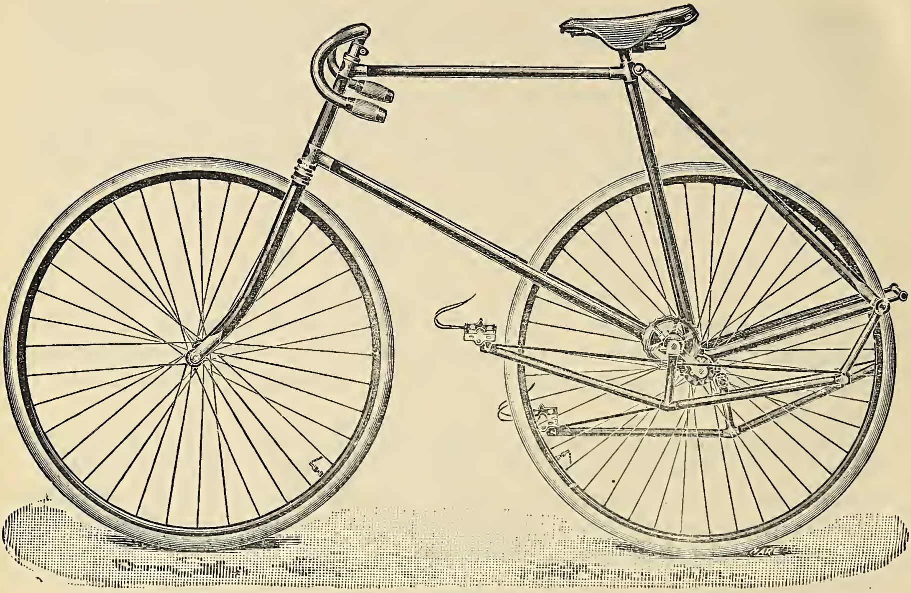
The inventor can, however, claim that the title "Power Utilizing Gear" is not inappropriate, for what the mechanism does is this: it varies the leverage according to the position of the pedal. It has already been seen that the greatest effective pressure from the foot is when the crank has moved down about 90° (*see* figure on page 396) and here we get the greatest leverage.

Whether this varying leverage gives any real practical advantage to the rider only personal experience of a trial can tell, but it appears to me to be doubtful whether it is wise to sacrifice leverage just when the pedal is moving over the dead positions, especially when the resistances due to hill climbing and wind are in operation against one. Where the greatest leverage is given is the very point where the pressure of the foot is applied with the greatest advantage and therefore the extra leverage is not required. I should be inclined to favour more the extra leverage being given when the pedal was passing over the dead points. But speaking generally on the subject of varying leverages, it must be remembered that for equally geared machines the mean leverage must be the same. What is gained at one point is lost at another and what is required is to so adjust the leverage that it is best suited to the power that can be applied by the rider.

In the Elliptic gear, the sun and planet wheel arrangement takes the place of the sprocket wheels and chains, the sun wheel being keyed to the driving wheel, while the planet wheel is rigidly attached to the end of a crank arm (for there is another crank on the other side) pivotted at the centre of the driving wheel. The ends of the cranks are rotated by the action of the two long bent levers, the fulcra of which are moveable as they swing through the arc described by two rods suspended from the frame. Owing to the well known peculiarity of the "sun and planet wheel" motion (invented by Watt in 1781 when he found himself forestalled in taking out a patent for the "crank and connecting rod") in order to get two revolutions out of the sun wheel for one of the crank, both sun and planet must have the same number of teeth—to get three revolutions the planet must have twice the number of teeth as the sun. By the arrange-

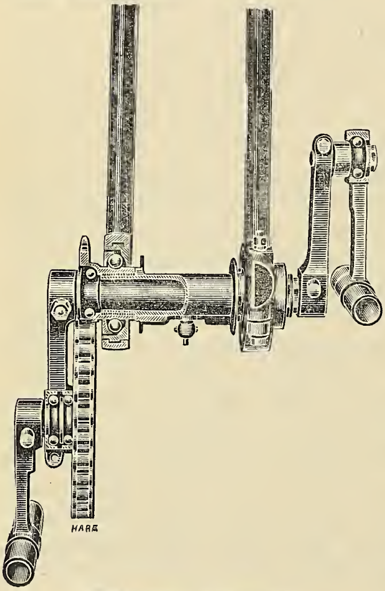
---

[1] These letters refer to a diagram drawn on the black board.



Elliptic (Fig. 1).

ment of the levers the pedal follows an elliptical path instead of a circular path. The inventor claims that by doing so he has cut out those portions of the circular path which are traversed by the pedal when passing over the dead points common to all circular movements—and he claims that in consequence the power required for a 70 gear on an Elliptic is equal to that required for a 50 gear on an ordinary chain machine.

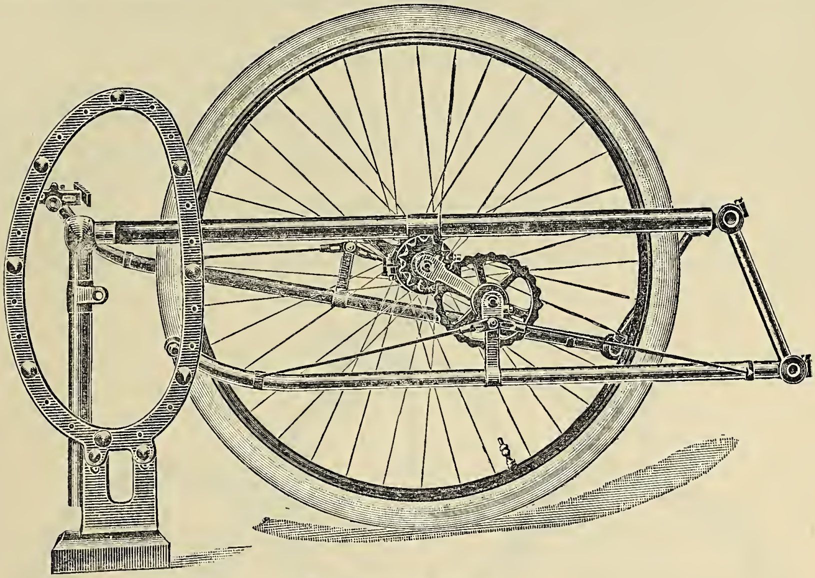


Elliptic (Fig. 2).

This, however, is assuming that the statement "that no effective work is being done when passing over those portions of the circular path which have been cut out" is correct. On examining the diagram (*B.*) it will be seen that there is no *point* much less two arcs of 36° each where effective tangential force is not being applied.

What, however, *is* perfectly true is that the dead points on the pedal path are not passed over simultaneously, i.e. the one at the top is passed over before the lower one is reached, and this can be appreciably felt when riding the machine.

Varying leverage is also obtained, the greatest being about the middle of the down stroke. The velocity of the pedal is variable approaching what is known technically as an "harmonic motion."



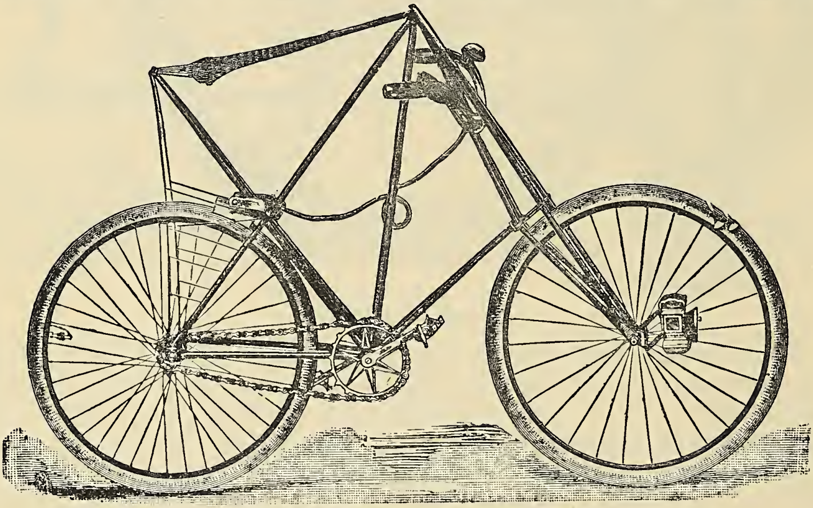
Elliptic (Fig. 3).

Since there is scarcely any form of machine in which a 'cam' does not take its place in the mechanism, it is not to be wondered at that a "Cam Bicycle" has been put before the public. (*See* diagram *H.*) The one exhibited shows two bevel cam discs keyed to the crank spindle; two links which hang from the frame terminate in rollers which fit into the cam grooves. To these rollers are also fastened connecting rods which are attached (by eccentric hoops) to the hub of the driving wheel and so the reciprocating motion of the rollers is converted into the circular movement of the wheel. It will be observed that here we have an equal pull on *each* side of the machine. The cam and rollers are enclosed in a dust proof box. Interchangable cam discs are provided for the alteration of gear and the change can be effected in a few minutes. The ratio of the number of revolutions of the driving wheel to that of the cranks depends upon the number of curves in the cam plates.

The "Pedersen."

Mr. Pedersen has very kindly lent me one of his rather peculiar looking machines to show you. He tells me that the discomforts of the ordinary bicycle saddle induced him to make various experiments which resulted in his adopting a kind of hammock seat, composed of strings of different degrees of tension and which is suspended between two supporting points about two feet from each other. He states that "all cyclists and especially ladies after once trying this seat will refuse to ride on any other ! ! "

Finding that the ordinary frame was not adapted for this form of saddle, the inventor decided upon constructing a new style of frame the outcome of which decision is now presented. It will be seen to consist of some twenty-one triangles and is constructed in such a way that every tube is either in a state of direct compression or tension. The weight is very small, the lady's roadster weighing only 16 lb., the gentleman's being 18lb., but it must be admitted that this saving of weight is at the expense of having no adjustable saddle or handle bar, no mud guards and very small wheels. I may remark that Mr. Pedersen has invented a suitable costume for ladies desiring to ride this form of machine, and I must say the lady I saw attired in it presented a very neat appearance. The first machine of this kind that was made was constructed of *poplar wood tied at the joints with wire and string.* I saw it myself after it had been ridden over 3000 miles.



The "Pedersen."

Among the numerous devices advertised for the saving of power is what is termed the '1898' crank which the maker tells us saves 20°/₀ in power. Its peculiarity is seen by the diagram[1] but I hope it requires no word from me to explain that the length of crank to be taken into consideration when calculating the relations between the power and the weight is the distance between the centre of the sprocket wheel and the centre of the pedal and all the "inventor" has done has been to hang a useless and dangerous piece of steel on to the end of the crank arm.

---

[1] Diagram drawn on the black board.

Everyone does a certain amount of travelling by rail each year and some of us are often in the habit of taking long voyages for pleasure or otherwise. I have, therefore, thought that the "Folding Bicycle" may appeal to those who have found the size and difficulty of packing an inconvenience. The top stay and one of the lower tubes are jointed in such a way that by unscrewing a bolt with a key the front portion of the machine folds back so that it can be packed into a basket or box of a convenient size. The handles also fold downwards.

In the same way the machine supplied by Messrs. Humber & Co., though not presenting any great peculiarity in the driving mechanism, deserves the attention especially of those who are likely to be going abroad. The frame is made with detachable joints, and the whole machine can consequently be packed up in a basket about nine inches high and two and a half feet square. The tubes are connected by cotter pins, secured by a simple washer and nut, and it is not too much to assume that a firm so well known as Messrs. Humber & Co. would not put a machine on the market without subjecting it to a severe trial and so ensuring its having the necessary strength, rigidity and durability. The tubes are specially strengthened at the joints by means of 'liners,' and the operation of taking the machine to bits and putting together again is a very simple one.

In connection with driving mechanism it is not inappropriate to mention that longer cranks to the length even of nine inches are ridden and strongly recommended by some riders. Some investigations carried out by a French Professor tended to prove that the proper theoretical length of the crank should be half the length of the thigh bone.

Major Holden, R.A. has been kind enough to bring over his Motor bicycle which for two years has been looked upon as one of the most interesting exhibits of the National Bicycle Show. It is, I am sure, the hope of the whole Regiment that the inventor will be as successful with this clever design as he has been with the many useful and practical examples of his ingenuity and skill that he has given to the Artillery. In case he is too modest to say so himself I would tell you that in connection with it he has patented an invention that will be of wide application i.e. *a double acting oil engine.*

Cyclometers are so very generally used now by riders that a study of the mechanism employed in two of those most universally met (i.e. *the Standard* and *the Veeder*) will perhaps be interesting. They are both made on the principle of the ordinary counting wheels.

Taking the Standard first, it will be seen that there is a clock face dial with three round apertures. Projecting tangentially is a worm spindle having at the end a star wheel with five spokes. The cyclometer is fitted to the front fork in such a way that a projection on one of the spokes of the front wheel strikes a spoke of the star wheel and turns it through a fifth of a revolution at each turn of the front wheel. The worm gears with a worm wheel having 144 teeth. Con sequently in 144 revolutions of the star wheel (*i.e.* 720 revolutions of the bicycle wheel) the worm wheel rotates once. At the end of this one revolution a projection on the worm wheel comes into contact with one of the ten teeth on the "*unit*" wheel and moves the latter through a tenth of a circle and brings a fresh figure in front of the aperture. When the unit wheel has completed one revolution a projection on it engages a tooth on the "*ten*" spur wheel, turns the latter through one tenth and brings a fresh figure in the second aperture. The same arrangement holds good with the "*hundred.*" spur wheel. Two very light double springs press against ratchet faces on the backs of the spur wheels, acting as detents and so prevent any movement except when required and also

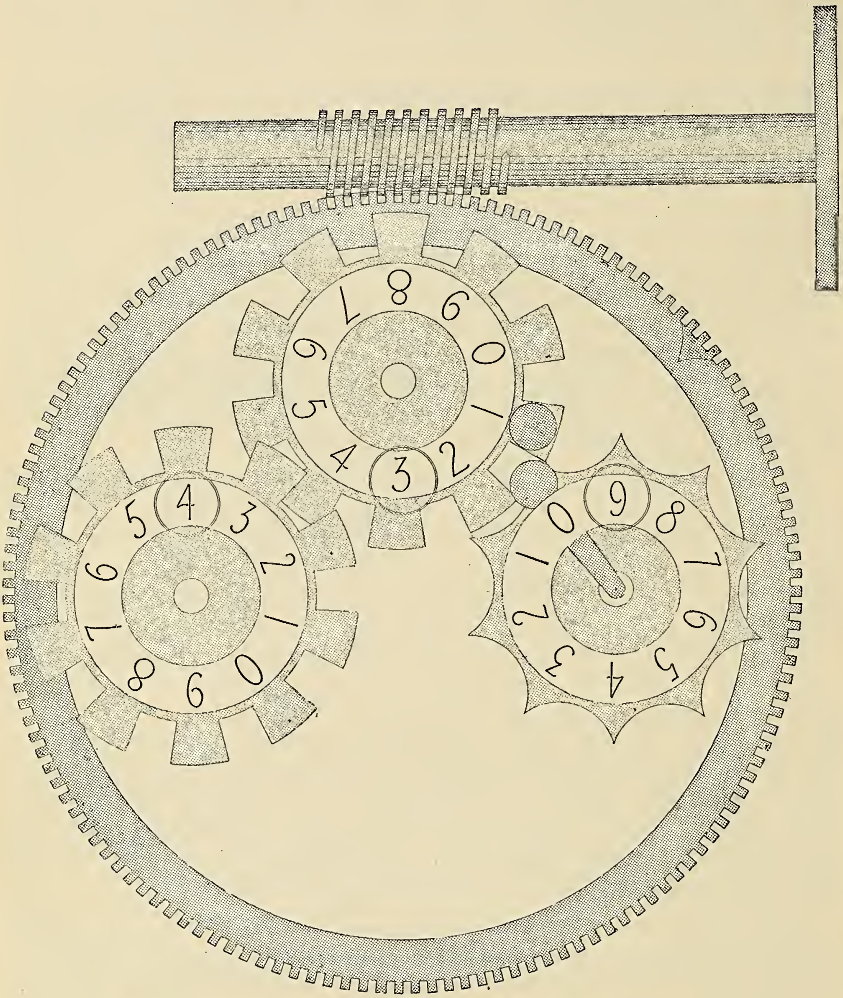


Diagram "C." The Standard Cyclometer.

ensure each number always appearing in the centre of the aperture.

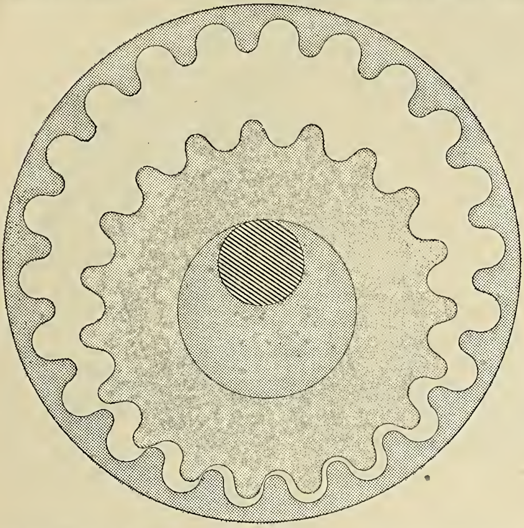


Diagram " D. 1"—The Veeder Cyclometer.

The "Veeder" cyclometer is on a somewhat different principle, the various figures being printed on the rims of discs which all rotate about the same axis.

The star wheel is on the eccentric spindle of a double spur wheel, i.e. two spur wheels (having 19 and 20 teeth respectively) keyed together; the 19 toothed wheel gears with an annular wheel (of 22 teeth) fixed to the frame of the cyclometer, the 20 toothed wheel gears with an annular wheel (of 23 teeth) on the inside of the "fraction" disc, which has to revolve once for each mile travelled.[1]

This combination forms an epicyclic train, the value of which can be worked out by the usual formula.[2]

On the "fraction" disc is a projection which, on the completion of one revolution, comes into contact with a small double four armed star wheel which gears with the teeth (ten in number) on the annular wheel of the unit disc, which is consequently moved one tenth of a revolution for each mile; the "tens" or "hundreds" discs are provided for in a similar manner. Very delicate springs prevent each disc being moved through more than the correct distance and hold the discs steady in position.

To explain the working of the epicyclic train without using the formula it may be taken in this way.

The small spur wheel has 19 teeth and consequently when the eccentric spindle has rotated once it has moved a distance equal to the pitch of three teeth (in the opposite direction) with relation to the fixed wheel, since $22-19=3$, and therefore it will take $\frac{19}{3}$ or $6\frac{1}{3}$ revolutions of the spindle for the spur wheel to rotate once round the eccentric spindle. The larger spur wheel in the same way having 20 teeth and the fraction disc 23, the same thing happens that is to say it moves back 3 teeth for each revolution of the eccentric spindle —but now it is seen that it will take $6\frac{2}{3}$ $(\frac{20}{3})$ revolutions of the spindle for the larger spur wheel to rotate once round the spindle and only

---

[1] A large working model of this cyclometer showing the mechanism was exhibited.

[2] $E = \frac{22}{19} \times \frac{20}{23} = 1{\cdot}07.$

$$E = \frac{M - A}{N - A} = \frac{0 - 145{\cdot}7}{1 - 145{\cdot}7} = \frac{145{\cdot}7}{144{\cdot}7} = 1{\cdot}07.$$

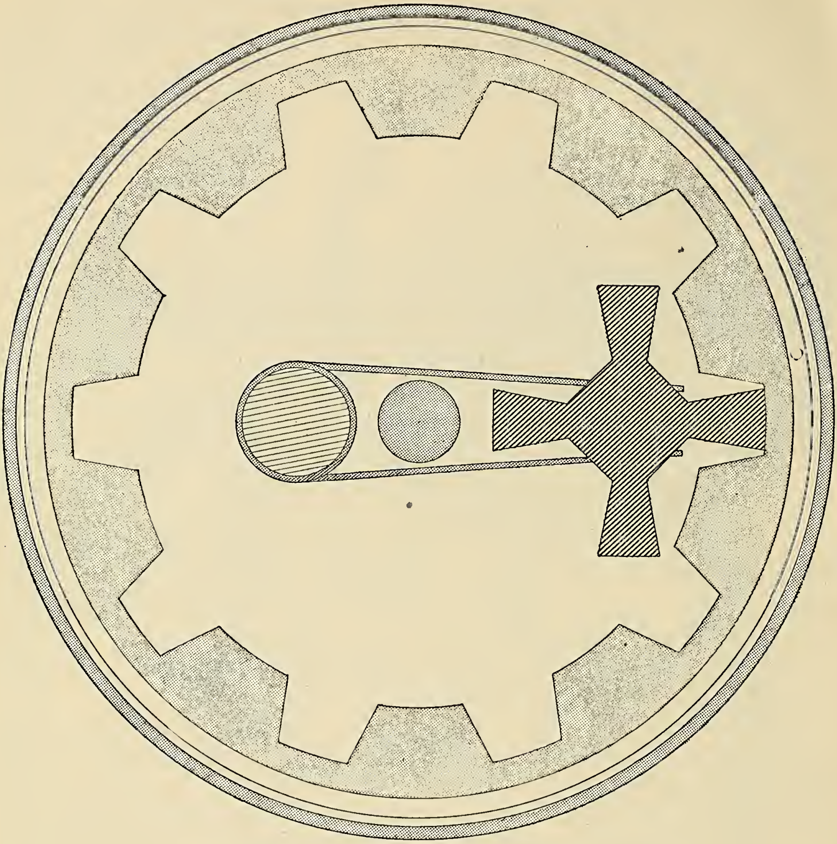


Diagram " D 2."—The Veeder Cyclometer.

$6\frac{1}{3}$ revolutions of the spindle for the smaller spur wheel to rotate once, but both wheels being keyed together they must revolve together and in order to do so the "fraction" disc has to give way, *i.e.*, it is pulled round a distance equal to the pitch of one tooth every $6\frac{1}{3}$ revolutions. Since it has 23 teeth it follows that the "fraction" disc rotates once in 23 × $\frac{91}{3}$ revolutions, i.e. once in 145·7 revolutions.

145·7 × 5 (the number of spokes on the star wheel) = 728·5 which is the number of revolutions calculated for a 28″ wheel to move one mile, making allowances for the thickness of tyre and variations in air pressure. I found from experience with the Standard which allowed 720 revolutions for a 28″ wheel that it was "out" to the extent of $\frac{1}{100}$ of a mile, a result that agrees very nearly with the 728·5 revolutions allowed for in the Veeder.

In conclusion, I must leave you, ladies and gentlemen, to judge the machines now for yourselves and say if you think you have seen anything to make you desire to change your present form of driving mechanism and would only add two words of advice, first that in buying a machine careful measurements should be taken and it should be made to fit the rider, and, secondly, the bearings, fittings &c. when once adjusted should not be pulled about except when absolutely necessary. It is a simple matter to know that by screwing up a cone or a nut something is tightened, and it is also a very easy thing to overscrew that cone or nut so as to permanently injure it.

I hope that any lady or gentleman who has ridden any of the machines exhibited will be kind enough to give us the benefit of their experience.

I will now ask Major Holden to show us his motor bicycle.

DISCUSSION.

MAJOR H. C. L. HOLDEN, F.R.S., R.A. then exhibited and explained the working of his patent Motor Bicycle. The following is a short description of the machine and a general idea of it will be obtained from the engraving.

The machine has a front wheel of twenty-four inches in diameter and a rear wheel twenty inches in diameter, the former being fitted with cranks and pedals to enable the bicycle to be started and assisted or actually driven if so required, whilst the latter has cranks on each side of it to which are attached the connecting rods of the engine.

The engine is built into and forms part of the frame of the bicycle proper, in such a way that it strengthens the frame and is mutually strengthened by it. The engine itself is a four cylinder gas engine consisting of two steel tubes forming the cylinders clamped between castings at either end by steel bolts.

In each of the tubes there are two pistons rigidly connected together, and the four pistons are furthermore connected by a cross-head pin, passing through the connecting rods. They thus move to and fro together, and rotate the hind wheel.

As in any gas engine using the Otto cycle, only one stroke in four is a working one; in this case however, owing to there being four cylinders combined together in one engine, every stroke is an effective one.

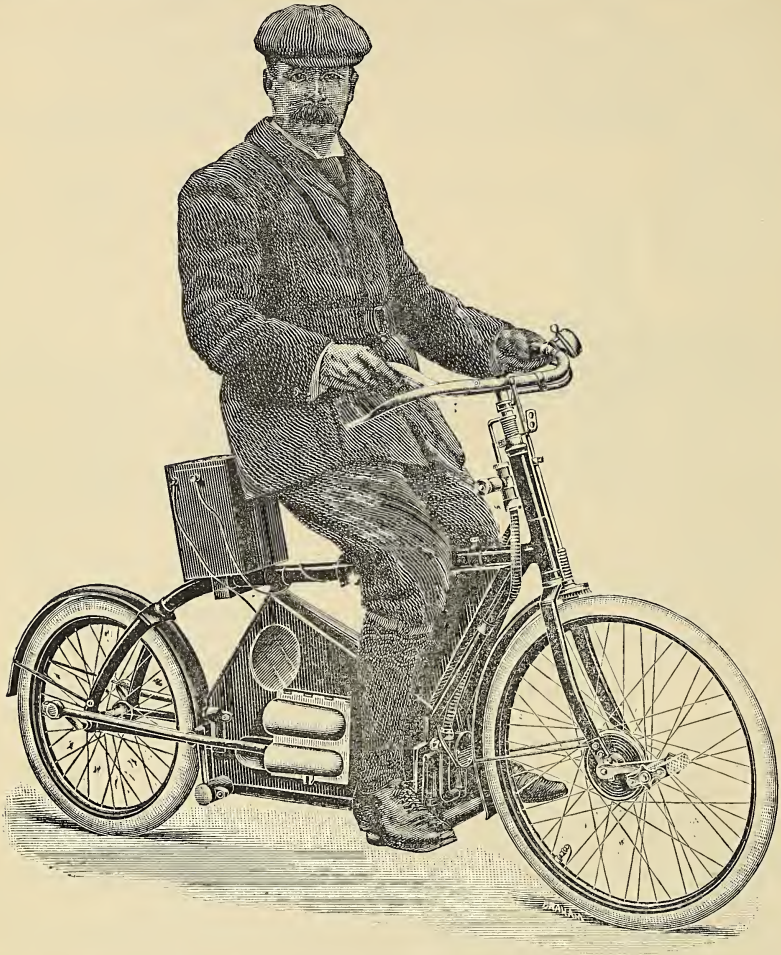
The firing of the explosive mixture is effected by an electric spark, the means for producing which are contained in a box situated behind the rider.

The saddle is fitted with a special post which allows of its being shifted six inches forward or backward so as to obtain the most comfortable position when the feet are on the foot rests which may be seen on either side of the machine.

The control of the machine is effected entirely from the handle bar.

On the right side just in front of the grip, is a trigger switch which allows the rider to cut off or turn on the electric current without shifting his hand; on the left side is a lever which can be adjusted by its milled screw head without letting go of the handle; this lever regulates the proportion of gas and air admitted to the engine cylinders thus controlling the power of the engine and, within limits, the speed of the machine.

The weight complete is just over 100 lbs., sufficient benzoline (from which the gaseous mixture is made), is carried in the tank to propel the machine some seventy-five miles. On level ground a speed of over twenty miles per hour is easily attained and gradients of one in fifteen can be ascended without assistance from the rider, with his assistance any hill that can be surmounted on an ordinary bicycle can be climbed and with greater ease. Going down hill this bicycle is always under perfect control as the supply of gas having been cut off, the compression of air in the cylinders acts as an efficient brake which works almost automatically, since it exerts more retarding action as the machine runs faster.



The advantages of such a bicycle over the ordinary form are that it enables the rider to cover long distances continuously at high speeds with practically no exertion beyond that required for regulating and guiding it and occasionally assisting it with the pedals when an unusually steep hill is encountered.

THE CHAIRMAN: There must be, I am sure, many members of the Institution who will be anxious to join in a discussion on the exceedingly interesting and clear lecture that we have heard from Major von Donop and also on the beautiful machine which Major Holden has shown us, I will in the first place ask Captain Lloyd, who has made some particular experiments in this matter, to offer some remarks.

Captain M. B. Lloyd, R.A.: I am afraid that, after the very interesting lecture that Major von Donop has given us and the treat we have had in the way of seeing all the new machines, what I have to show you is rather dull; but I made some experiments the other day with a view to finding out exactly how much thrust came upon the pedal in every different position of the crank and in fact, similar results were obtained by me to those obtained by M. Bonny. In this diagram (exhibiting the same) Fig. 1, taking *this* ⊙ as the centre and *these* the various radii of these curves as the different positions of the crank, those two curves the black and the dotted, show the effective thrust which I personally was able to exert upon either pedal respectively in every position, the radius vector in any position being proportional to the tangential, that is the effective thrust on the pedal, and the second diagram here, Fig. 2, shows these two put into one. It is curious, by the way, what a lot of difference there is between the right foot and the left. In this one, Fig. 2, the two thrusts in each position are added together and multiplied by the length of crank, 6½ inches, giving the total torque on the crank; and this black curve inside is the theoretical curve which should be given were the force applied direct from the hip and equal to my own weight. I was very much surprised (I made these experiments fairly carefully) to find how very much more than my own weight I was thrusting on the pedals. These fairly well agree with the diagrams which Major von Donop showed us, except that *this* (*a*) being the front of the bicycle, the saddle being *here* (*b*), they are turned through an angle of about twenty degrees and of course *those* diagrams must have been taken with the rider sitting right forward over the pedals in the scorching position.

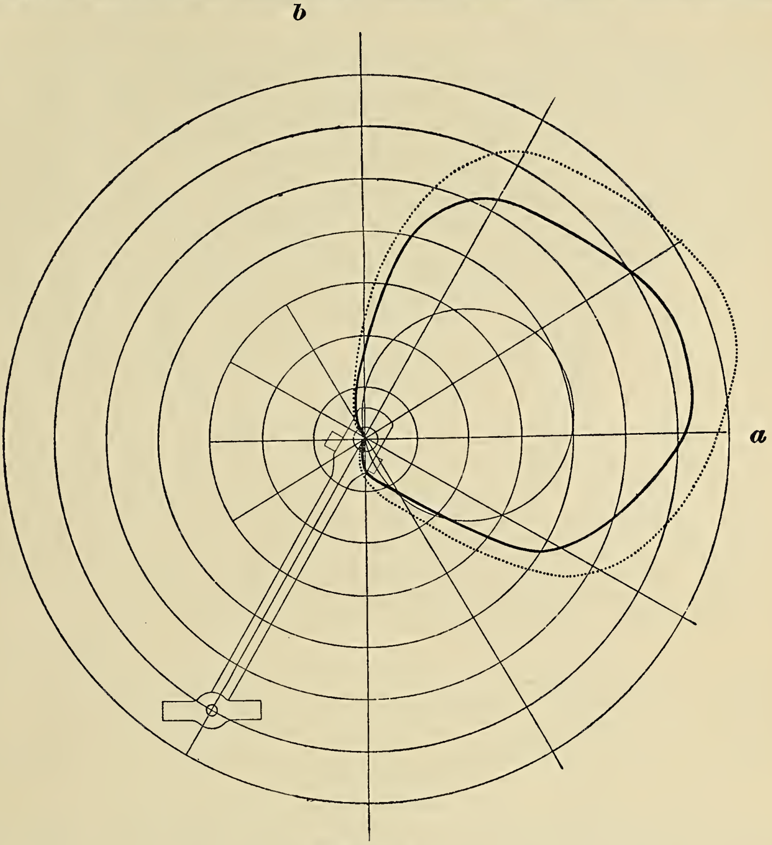


Fig. 1.

I might add that these diagrams were taken with a dynamometer at rest and

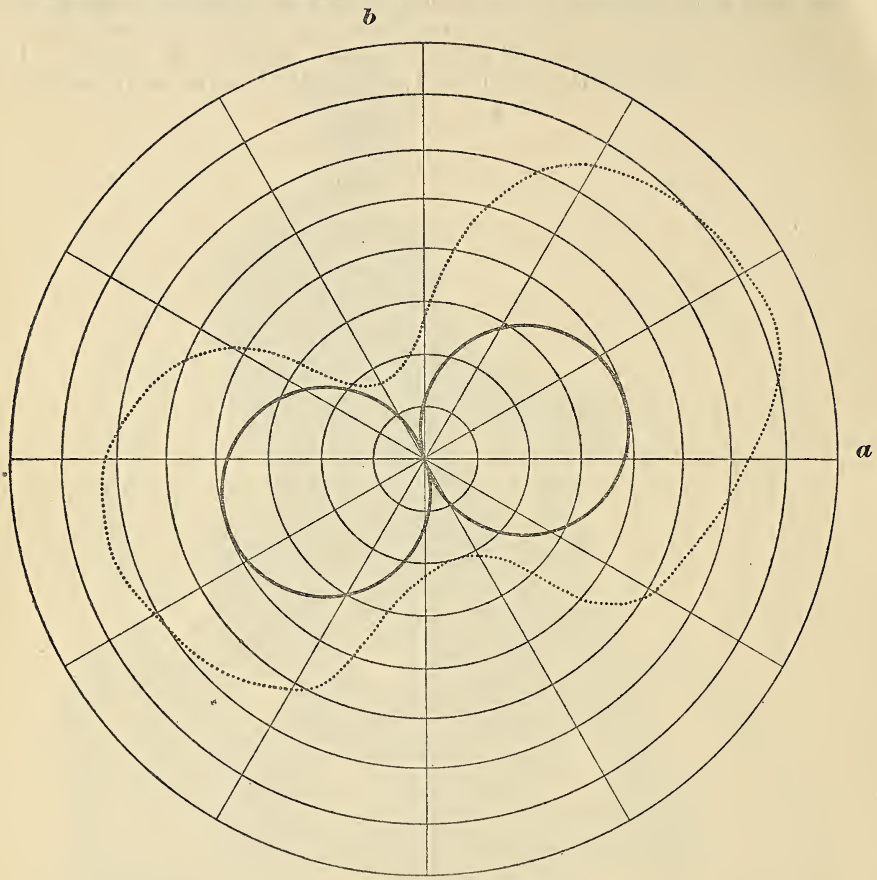


Fig. 2.

represent the maximum thrust I could produce when moving very slowly, when moving at speed they would be considerably modified.

Major von Donop: The dotted line represents the position of the saddle; it points towards the saddle.

The Chairman: Will any other Member offer any remarks? I see a recent addition to the ranks of bicyclists here in the person of Professor Greenhill.

Professor A. G. Greenhill, F.R.S.: It is for that reason, Sir, that I feel I am not qualified to take any part in this discussion, having only just begun on the machine. Perhaps, however, my impressions of the evolutions are more vivid and more valuable than they would be at a future day when I am more accustomed to the motion.

The "Dynamics of the Bicycle" has been proposed as the subject of a Prize Essay by the Paris Academy of Sciences. In its generality the motion is hyper-elliptic, tending gradually to an elliptic solution, in its penultimate stage of steadiness; and with perfect skill all trace of elliptical transcendentalism disappears. I assume that the riders will have reached the elliptic stage before they are permitted to venture out upon the road; for myself I have not yet emerged from the hyper-elliptic stage.

No prize has yet been awarded by the French Academy for any of the essays sent in. Perhaps the writers had not sufficiently remembered the peculiar psychological impressions of the initial stage which I have mentioned; but I hope some of the experts in the room may be encouraged to compete for this prize, while it is still open.

The Chairman: I am sure that Members of the Institution who are expert bicyclists and who have passed this hyper-elliptic stage must many of them be anxious to join in this discussion. Before I offer the few remarks which have occurred to me in connection with this extensive subject, I must in the first place say how great an honour I feel has been done to me in asking me to take the chair on this occasion. I am told by your energetic Secretary that this is the first time that a civilian has ever held this honourable position (applause), I feel naturally in any case entirely unqualified for such an honour and especially at the present time when I see those members who are near me on my right I feel that it is quite inappropriate that I should be in the chair ("no, no").

Now coming to the subject of the Lecture itself one would be tempted of course to take each head of the lecture and say a good deal about it; the clock however, reminds one that that is of course quite inadmissable. I will mention one thing that I see I have marked; it is that ingenious contrivance of Turnbull's. One does not wish, of course, in any way, (since he is a neighbour of the Arsenal) to say anything that may appear hard; but it is an obvious thing that any contrivance of the kind in which there is so much extra weight, in which there is so much extra friction, and in which there is opportunity for so much dirt to get in, to clog and interfere with the working of the parts, and which cannot by any possibility increase or add to the power, cannot have any very great practical advantage and it has obvious practical disadvantages. So that it may be classed, I think (I am only giving my own view), with a great number of other ingenious machines; none can help admiring their ingenuity but they cannot serve any practical purpose.

In the elliptic Path machine, which is a much more practical thing in its design, there is what may perhaps appear to be the advantage of there being no dead points. In the first place I ought to state that it is quite obvious, of course, though people do not always see it, that there is no dead point in an ordinary chain-driven machine such as 99 out of 100 or 999 out of a 1000 people ride. There is no dead point in the chain and sprocket wheel connection and even the rider himself is not subject to dead points, for with proper pedalling there is some power available both at the top and the bottom of the stroke. People do not always use proper ankle action even if they use any, as can be very easily seen by watching the average rider in the street where it is very usual to see the chain sag twice in every revolution—a very improper effect. But even if there is a freedom from a dead point, in this sense, that the upper foot is already beginning to descend before the lower foot has finished descending, that can only be in virtue of the fact that the foot is not going at a uniform speed round the path, that it is an example of a quick return movement so common in sloping machines. This I believe when the speed is high, becomes exceedingly tiresome. It is for this reason, I think, more than any other that the simple plain chain machine with equable motion is practically advantageous over all these other contrivances.

I was exceedingly pleased to see Pedersen's frame of which, up to the present I have only heard. Looking at that, as I have done from across the room without seeing it closely, I could not help admiring the design as appearing something eminently scientific and correct in every detail. I was a little puzzled when I heard that a lady's machine had been made on those principles, and I can only imagine that if that is the case the lady's dress becomes an essential feature—the new dress, I mean, that Major von Donop spoke of; I do not see how the principle can be carried out otherwise.

Major Holden's machine, too, I have heard of, and heard a great deal of since it was invented and I was exceedingly anxious to see it. I am sure that my disappointment is exactly the same as that of everyone else at not having seen Major Holden, I will not say careering round the room, but at any rate riding the machine on the present occasion.

There are a good many other points that I might, if there were more time, venture to weary you with. One machine I will just refer to while I think of it, and that is the machine called the Northfleet. I had one of those sent to me to try some short time ago, but I came to the same conclusion exactly as Major von Donop has done, viz., that the trial of a machine for an odd day or two casually is no real trial; it is not until you have spent a good many weeks upon a machine and have ridden a good many hundred miles that you are in a position really to judge whether it has important advantages or not. I must say I was surprised to find the changing of gear from high to low and the reverse was effected at once without any trouble. I did not think the contrivance was very practical from the look of it, but I had no difficulty in making it work. Still, in the short time that I tried it I cannot say that I felt particularly pleased with the change of motion in any way. I should like to refer to it in this sense, as a development of the machine called the Omnicycle, which was not a bicycle at all, which came out about the year 1880 when all kinds of machines were being put upon the market in the hope that something would catch on, as they say. In the Omnicycle a feature which the inventor laid so much stress upon as being entirely useful and certainly ingenious was the fact that during the whole part of the stroke of the foot where the power was applied in a way somewhat akin to that in the Northfleet, the foot was acting at the same constant leverage. I pointed out to the inventor at the time that the design was ingenious and that the intended result was attained, but that I did not look upon it as an advantage because, especially with high gear and high speed you do not want the foot to have to start suddenly from its position at rest to the speed of the machine, and you do not want to stop the foot suddenly—you cannot do it; all motion of the foot at a speed less than that corresponding to the motion of the machine is wasted, you cannot either start or stop without an effort or a jerk. If, therefore, instead of having the same gear through the whole stroke the bands were made to work on eccentric and not concentric arcs as in this machine, the radius of the arc getting less and less towards the end of the stroke, the gear would in effect towards each end of the stroke become higher and higher the necessary velocity of the foot before and after being in touch with the machine would be less, and less waste and shock would be felt. I think even as it is there is some real loss which may or may not be equivalent to certain undoubted gains that are obtained by this machine.

I understand that the Bantam machine, from my small experience with that, is certainly subject to more friction than the ordinary machines. I know that the work of the Crypto Company (and I have known it for the past fifteen years or so) is absolutely of the very highest possible class, and if it were not so the thing would not work. This class of machine requires the perfection that this company have always put into their work. I have found, however, that though the machine is necessarily beautifully made, if you have a pair of riders of equal weight and surface and they alternately ride a rear-driving safety (Rover pattern) and a Bantam down a gentle gradient with their feet off the pedals, the Rover type gets away from the Bantam. I have never on that account, partly that and partly from the comfort, or rather the discomfort of the thing, preferred the Bantam type of machine to the Rover type.

With regard to the cyclometers I must express my admiration for the way in which Major von Donop attacked, without formulæ, and without a blackboard, and without even a diagram, that double epicyclic mechanism which drives the first motion wheel of the Veeder cyclometer. Any epicyclic contrivance is difficult enough to explain at any time, but where there is a double epicyclic mechanism like this it becomes still more difficult to explain. I certainly did not think when he began he would succeed in the absolutely clear and lucid manner that he did (applause).

Speaking of cyclometers I thought that perhaps the members of this Institution might be interested to see a little French cyclometer that was sent to me as a present by a friend a short time ago; I have brought it with me, and it is here for anyone who likes to look at it afterwards. It is purely and typically French in this respect, that it is far more scientific than anything that would ordinarily meet with favour in this country—the English people are not a scientific race—I am speaking of the general public—they do not like anything they do not understand.

This (exhibiting the same) is the little machine; it is bigger certainly than the Veeder. It is made to be clamped upon the handle bar, and to be driven by a catgut band from a little pulley wheel clamped on the outside of the spokes of the front wheel of the machine. Inside this box there is a clock or watch which goes and the rider sees upon the dial facing him the hours and minutes marked on two drums visible through an opening on the face so that he can see the time. That same clock draws a ribbon of paper over a toothed drum under the lid, the ribbon of paper is drawn along and a small pencil is kept in contact with the ribbon. Every hectomètre or tenth of a kilomètre—call them miles if you like—every tenth of a mile this pencil moves a small step on the horizontal scale and keeps quiet. Meanwhile the ribbon of paper passes along in front of the pencil and draws a straight line. It does not take more than a few seconds or minutes to go another tenth of a mile when the thing makes another step, and so this pencil makes a notched mark with ten little steps every mile. At the end of each mile it suddenly jumps up and starts again; so that when the rider gets home and looks at the ribbon he finds a series of little zig-zag saw teeth drawn upon it, each one representing a mile. The ribbon has the hours and minutes already printed upon it so that he can see the time at which he was at any distance from the starting point to the nearest tenth of a mile. In addition to that if he stops the pencil stops, and a long straight line is drawn, and when he goes on again the saw-teeth begin to be drawn again. Then in addition, on the face, where the time is seen, there are three openings such as you have in the upper one of those cyclometer diagrams on the wall, and there are three figures which shew the total number of miles that the machine has gone. And finally there is a hand working over an arc which, according to the speed at which the machine is moving at the time takes some position. It points at 0 when the machine is at rest and at 5, 10, &c. when the machine is at the time travelling at 5, 10, &c. miles an hour. It might be useful in case of arrest for furious riding to enable the rider to know what speed he really did attain. I have not been out with this instrument at present, so I cannot say from my own experience how it works, but it is evidently suited for auto-cars and machines like Major Holden's petroleum bicycle with speeds perhaps of fifty to sixty miles an hour, or at anyrate at what a policeman would call dangerous speeds which are more than likely to be developed by such machines than by an ordinary bicycle.

I will ask Major von Donop to correct any errors that any of us may have fallen into.

REPLY.

Major von Donop: I have only one or two words to say.

With regard to that excellent cyclometer I think it only wants one addition to it, that is that it should clean your bicycle for you when you take it home.

I am very much obliged to Captain Lloyd for giving us those diagrams, and I shall be still more obliged to him if he will lend them to me so that we can compare the results he obtained by experiment with those of this other diagram of which I have more details.

With regard to what Mr. Boys said about Turnbull's machine, I picked that out specially as one that would be perhaps interesting to us as Woolwich people, and also to show the fallacy of these forms of machine that were made and were stated to give extra leverage, like expanding cranks, &c.

I omitted to say that in trying the "Elliptic" machine I found that the movement of the foot was variable; it moved up and down and approached what is known technically as "a simple harmonic motion," and I can quite believe that at high speeds it would be very inconvenient, as Mr. Boys says.

Mr. Boys mentioned Pedersen's frame, and there is another thing I omitted to say before. The first machine that was made I saw at the Crystal Palace, and Mr. Pedersen told me (and I quite believe from its appearance that what he said was true) that he had ridden it some 3,000 or 4,000 miles, and it was made of poplar wood tied together at the joints with string and wire; and that led him to be perfectly sure that his calculations as to the angles were correct.

With regard to the point mentioned by Mr. Boys in connection with the Veeder cyclometer and avoiding the use of formulæ. I am afraid I do not like formulæ very much and if I can possibly avoid them I do. For one thing I have a bad memory and one is apt to forget the formulæ; and also I have to do, to a certain extent, with other people who hate formulæ almost as much as I do, so that whenever possible when I am working out any piece of mechanism, or explaining anything of that sort I try if I can to avoid the use of formulæ.

The Chairman: I am sure you will all join me in giving the lecturer a very hearty vote of thanks for his admirable lecture (loud applause).

Major-General F. T. Lloyd, c.b.: I feel that I am interpreting your wishes, ladies and gentlemen, if I offer in your name our best thanks to Mr. Boys for presiding over our meeting to-night, and for the very interesting remarks that he has made upon the lecture that we have had so much pleasure in hearing (loud applause).

Diagram "F".

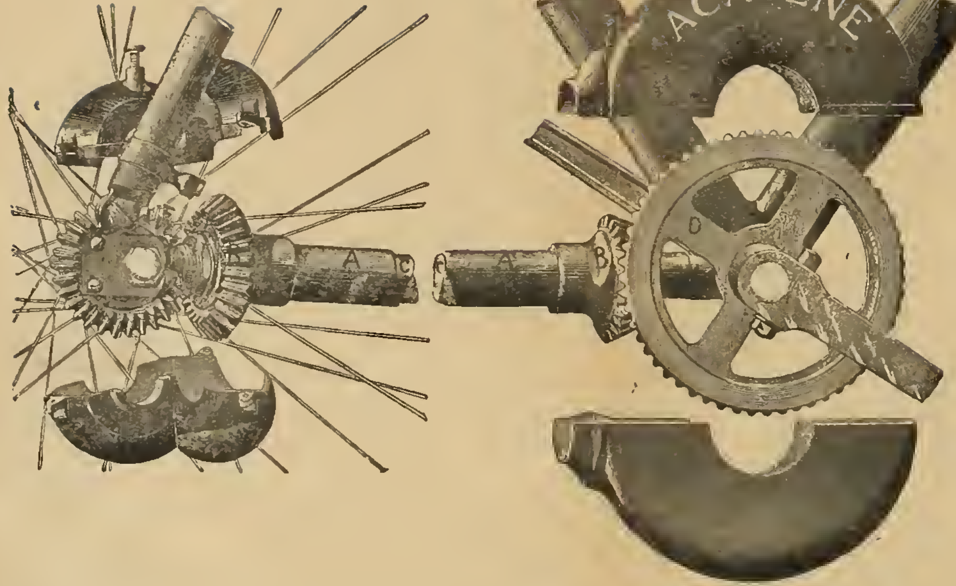


Diagram "G."—QUADRANT (LLOYD'S CROSS ROLLER).

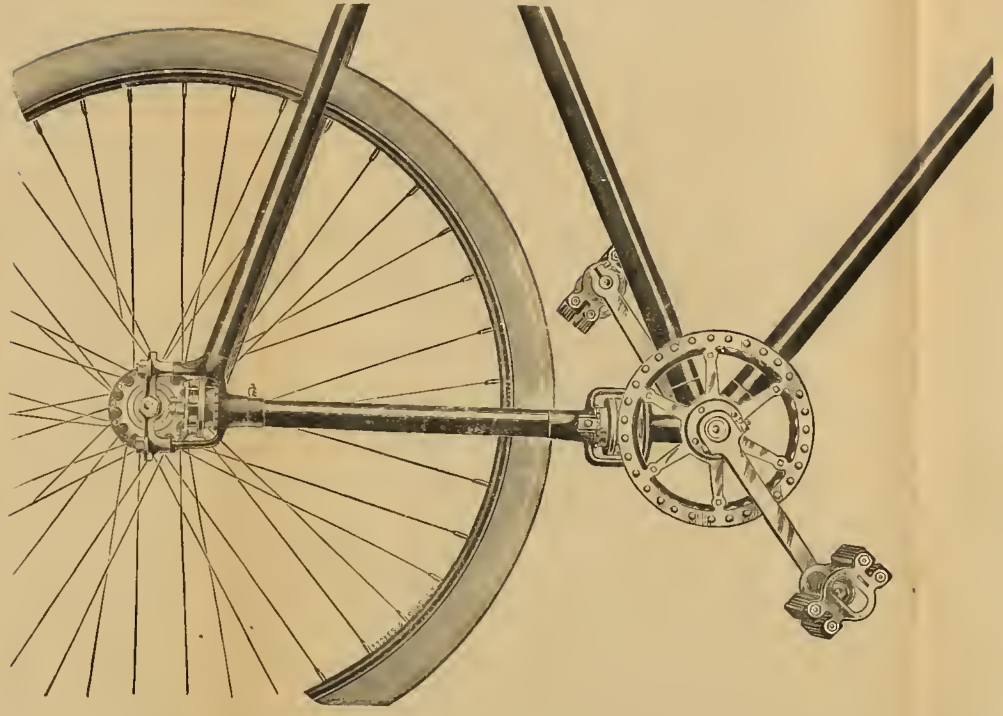
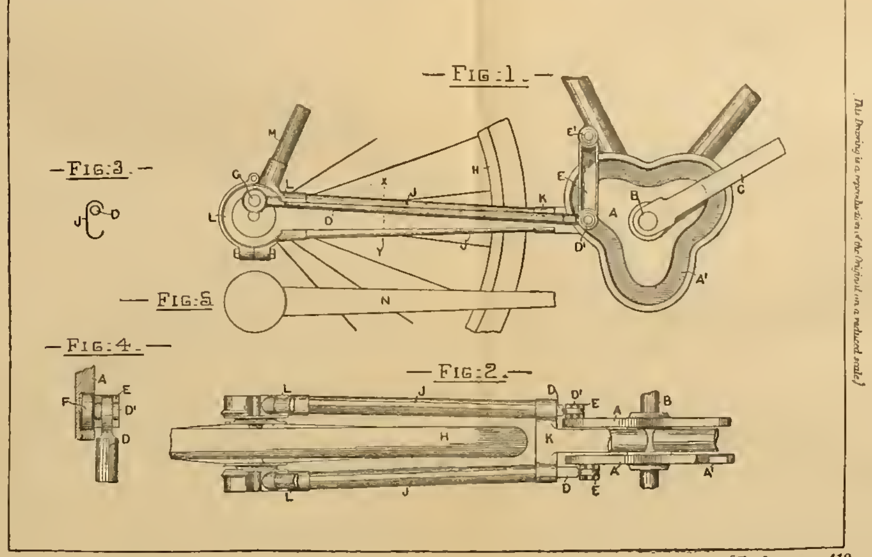


Diagram "H."—The "CAM".

1895. Dec. 31. Nº 24,823.
PRICE & others' Complete Specification.
(2nd Edition)



(This Drawing is a reproduction of the Original on a reduced scale)

[To face page 412.

THE ARTILLERY IN THE REBELLION OF 1798.

BY

LIEUTENANT T. M. KOUGH, R.A.

WHATEVER may be our individual opinion of the action of the Irish people in celebrating this year the centenary of ninety-eight, it can do no harm if we consider, with minds free from all religious and political rancour, the conduct and action of the artillery during that eventful period.

The greater part of the artillery serving in Ireland during the rebellion consisted of companies of the Royal Irish Artillery. This corps was formed in 1755, and at the time of the Union in 1801 was amalgamated with the Royal Artillery. In 1798 it comprised ten companies, of which six were serving in Ireland: a reorganization into brigades was also being carried out at the time. The Royal Irish Artillery is at present represented in the service by the 3rd, 4th, 9th, 18th and 28th Field Batteries and No.'s 4, 10 and 11 Companies, Western Division, Royal Artillery.

The Royal Artillery proper that took part in the suppression of the rebellion consisted of A, B and C Troops,[1] now A, B and C Batteries Royal Horse Artillery. These came into action during the later hostilities in Wexford, fighting at Ross and Vinegar Hill.

Besides the Royal Artillery and Royal Irish Artillery, there were two battalion guns attached to most infantry regiments. These were usually 6-pounders, but sometimes 4-pounders, called from the lightness of their mountings "curricle guns," took their place.

"As might be expected," says Maxwell, "the battalion guns were neither rapid nor brilliant in their practice." In the attack on Naas on the 24th May, two battalion guns in the possession of the Armagh Militia played some part in the defence. A serious attack was made by the insurgents on the jail, in front of which one of these guns was placed. Its fire was interrupted by a premature cavalry charge, but up to this it had had very little effect; and a rebel afterwards confessed that one of the gun squad had been suborned and had purposely elevated the gun too high to do any damage. This naturally implies gross ignorance on the part of the many, as well as treachery on that part of the individual.

---

[1] Two guns each.

In the assault of the rebel encampment on Tara Hill on the 26th May, a battalion gun belonging to the Reay Fencibles comes prominently forward. The insurgents made three desperate charges from the hill, and in the last actually laid hold of the gun; but the officer in charge of it (whose name I can not ascertain) fired it before they had completely surrounded it, prostrated ten or twelve, and scattered the remainder.

Artillery played no part in the earliest operations in Wexford. The Royal Irish Artillery first appears on the 29th May. The garrison of the town of Wexford being thought insufficient, General Fawcett marched from Duncannon Fort to its relief with a considerable force. He foolishly, however, sent forward his artillery with seventy of the Meath Militia as escort; and this party was surprised near the rebel camp on the Forth mountain. The artillery comprised a corporal and seventeen gunners of the Royal Irish Artillery, with two howitzers, under the command of Lieutenant Birch, who describes the incident as follows :—

"Having proceeded some distance at the foot of a high mountain, we were suddenly attacked by several thousands of the rebels, who with loud shouts opened a sharp fire on all sides against us . . . . . . After the first discharge, the militia betook themselves to flight, having thrown away their arms—while we attempted in vain to prepare again for action—but the horses, not trained to fire, grew furious and unmanageable, so that it was impossible to do anything; and we were thrown into such instant confusion by the sudden flight of the infantry, we found it utterly impossible to spike the howitzers. Three of the Meath officers, with most of their men, were killed, and one taken. On our part, besides the howitzers, four gunners were killed; one corporal and eleven gunners taken, two of whom were afterwards killed at Ross; the rest have arrived here (Duncannon) safe; and two gunners and myself escaped."

The attempt of the rebels on Newtown Barry on the 2nd June may fairly be called the critical point of the Wexford outbreak, as, had it been successful, the flames of insurrection would certainly have spread into Kilkenny and the province of Munster. The failure of this attack was largely owing to the discharges of grape from the guns.

The greatest disaster to the British arms in Wexford was yet to come, namely, the surprise at Tubberneering. Lieut.-Col. Walpole was sent from Dublin to reinforce the small army of General Loftus. His was one of the "Castle appointments" which have from time to time done so much harm in Ireland, and his military knowledge appears to have been nil. On joining General Loftus, he insisted on his right to an independent command, and moved from Carnew towards Ballymore, having with his force a party of Royal Irish Artillery with two 6-pounders and a howitzer. Near Clogh, Captain Duncan of the artillery perceived signs of an ambuscade and informed Walpole, but was only laughed at for his trouble. At Tubberneering the British force, marching without any precautions, was attacked and utterly routed by the insurgents. Duncan was brought, badly wounded, into Gorey, but had to be removed to Wicklow as the rebels were pressing on. The three pieces were taken, but one did very good work at first, as Musgrave thus testifies.

"The following anecdote of the Royal Irish Artillery, whose valour and loyalty have been conspicuous on all occasions, deserves to be recorded. During the confusion and dismay which took place among the troops, when they were surprised in the road at Tubberneering, the gunners of the artillery, with the most deliberate coolness, levelled one of the hedges of the road, dragged the gun into an adjacent field, and fired with excellent effect at a numerous body of rebels who were posted on a high rock, from whence, with their musketry, they had killed many of our soldiers. They drove the rebels from that advantageous position, after having killed a number of them, and contributed materially to prevent the complete destruction of the army."

The battle of New Ross, fought on the 5th June, was the hardest contested during the rebellion. The British forces in the County of Wexford had now been materially strengthened, and the artillery engaged consisted of the three Horse Artillery Troops previously named, which did good service.

Having already noticed the valour of the Royal Irish Artillery in action, we may now see what gallant constancy they showed in the midst of captivity and degradation. In the action at Ross, a gunner taken prisoner at Forth was tied to a captured field-piece and forced to fire it three times. He elevated the gun too high to do any harm, and with his last round knocked a small piece off a roof. The unfortunate man made some remark about the great effect of his shot. "This is a much better shot," said a rebel, sending a pistol bullet through his head.

In the unsuccessful attack which the insurgents made on Arklow on the 9th of June, the defenders had no artillery except the battalion guns of the Durham Fencibles. The rebels used the guns which they had taken at Forth and Tubberneering, and Sergeant Shepherd of the Royal Irish Artillery was obliged to manage them. Having once loaded with grape, he traversed a gun a little to one side and swept down about thirty insurgents. Fortunately for him, this result was ascribed to the fire from the town. Being then ordered to load with round shot, he loaded again with grape instead, knowing that it could do no harm at that range, and fired as quick as possible so as to waste ammunition. On a second order to load with round shot, he did so, but elevated so high as to do no damage. The rebels then relieved him of his charge, thinking it better to work the guns themselves.

The Royal Horse Artillery and Royal Irish Artillery fought side by side in the victory at Vinegar Hill on the 21st June. The artillery proved of great use both on the march to the hill and in the actual assault; and when some of the guns had reached the summit, they opened fire on the thick masses of the rebels with tremendous effect. In many of the small actions, which ended the Wexford campaign detachments of the Royal Irish Artillery were present and did good work.

During the Ulster outbreak, the guns were mostly served by infantry. There were two 6-pounders and two howitzers in action at Antrim, two 6-pounders at Saintfield, and eight light pieces at Ballinahinch. On the first success of the rebels at Antrim on the 7th June, the guns were abandoned under the wall of Lord Massareen's domain.

The only member of the Royal Irish Artillery present, Lieutenant Macartney, who was serving as a volunteer, hastily collected a few men, drew the guns up on to the garden wall in the midst of the enemy's fire, and dislodged the latter after a few rounds. This proved to be the turning point of the action; re-inforcements arrived almost immediately, and the rebels were defeated.

The heroes of the last act of the rebellion are General Humbert and his Frenchmen; but the Royal Irish Artillery gathered laurels on the scene of one of the most disgraceful reverses that the British arms have ever met with. Humbert's forlorn expedition, numbering in all about a thousand, landed in Killala Bay on the 22nd August. He took Killala and marched on Castlebar, where he was opposed on the 27th by a large force under Major-General Hutchinson. Lecky's estimate of the numbers engaged, which is most likely correct, is as follows: British 5,200, French 700, insurgents about 500. The Detachment of Royal Irish Artillery, with eleven field-pieces and one howitzer, was under the command of Captain Shortall, who had left in the town of Castlebar two curricle guns under Lieutenant Blundel.

The British force occupied a ridge north of the town. Humbert formed up behind some rising ground in front, and twice attempted to charge Hutchinson's position. On each occasion he was checked by the artillery fire and obliged to retire behind his cover. In a third attack he masked his men by driving cattle on in front, but the artillery fire was still too fierce for them to advance. He then made a fourth attempt, by deploying rapidly from his centre and rushing the British position. The whole defending force here upon broke up in confusion, except the artillery, who had only time to fire three rounds. The gunners were then cut down and the guns taken.

The Irish insurgents called this affair "the race of Castlebar" from the way in which the British ran. Some of the fugitives rallied at the bridge of Castlebar, where was posted one of the curricle guns which Shortall had left behind. This gun, worked by Sergeant Gibson and a detachment of Royal Irish Artillery, checked the advance of the French for a short time, until all the detachment were killed. The enemy then rushed the gun, and the remainder of the British force joined their comrades in flight. Fourteen pieces altogether were captured by Humbert in this engagement.

Humbert, unable to raise the populace to any extent, abandoned Castlebar on the 4th September and surrendered to Lord Cornwallis at Ballinamuck on the 8th. With the capture of Killala on the 23rd September the rebellion ended.

Before concluding this short review of the conduct of the artillery during this trying period, two points not yet noticed should be emphasized. One is that, when, at the outbreak of the rebellion, almost all the troops in Ireland were honeycombed with disaffection and sedition, no man of the Royal Irish Artillery, though exposed to very great temptation, ever wavered in his allegiance. The second is that, while many horrible and deplorable atrocities were committed on both sides during the course of the insurrection, neither the records of the time nor even the imaginative traditions of the peasantry have ever charged the Royal Artillery or the Royal Irish Artillery with the commission of a single act calculated to cast a slur on the record of the glorious regiment which now includes them both.

LIST OF THE PRINCIPAL EVENTS IN THE REBELLION.

	1798.
Outbreak of the rebellion	23rd May.
Rebel attack on Naas	24th ,,
Defeat of the rebels at Tara	26th ,,
Rebel victory at Onlart Hill, Wexford	27th ,,
Rebels take Enniscorthy	28th ,,
Surprise of the artillery at Forth Mountain	29th ,,
Drawn battle at Forth Mountain. Wexford abandoned and afterwards occupied by the rebels	30th ,,
Rebels defeated at Gorey	1st June.
Rebel attempt on Newtown Barry	2nd ,,
Defeat of Walpole at Tubberneering. Rebels take Gorey	4th ,,
Defeat of the rebels at Ross	5th ,,
Northern rebels defeated at Antrim	7th ,,
Northern rebels defeated at Saintfield	9th ,,
Rebel attack on Arklow	9th ,,
Northern rebels defeated at Ballinahinch	13th ,,
Defeat of the rebels at Longridge, Wexford	19th ,,
Defeat of the rebels at Vinegar Hill	21st ,,
Surrender of Wexford	22nd ,,
Rebel defeat at Ballygullen; end of the Wexford rising	4th July.
Landing of Humbert. French take Killala	22nd August.
French victory at Castlebar	27th ,,
Humbert abandons Castlebar	4th September.
Surrender of Humbert at Ballinamuck	8th ,,
Capture of Killala ; end of the rebellion	23rd ,,

THE DIARY OF THE 10TH FIELD BATTERY, R.A., WITH THE MALAKAND FIELD FORCE.

— BY —

LIEUTENANT C. N. B. BALLARD, R.A.

ON the 29th July, 1897, the officer commanding the 10th Field Battery, who was on leave in the Gullies near Murree, received a wire from the D.A.A.G., R.A., Punjab command, that a recommendation had been sent by the Command, recommending that the Battery (then stationed at Rawal Pindi) should be sent to the Malakand, in consequence of the outbreak which had taken place in Lower Swat. Information was at once sent to the battery of the possibility of mobilization and steps taken so that it could be done with the least possible delay.

On the 31st July a wire from Simla was received saying it was not considered necessary to send Field Artillery.

On the 1st August, however, another wire came from Simla to the Punjab command at Murree ordering the Battery to mobilize as part of a Reserve Brigade, the British troops (two battalions) mobilizing at Pindi, and the native troops (also two battalions) mobilizing at Hoti Mardan.

A private wire from the D.A.A.G., R.A. sent the major and one subaltern who was on leave with him down to Pindi, but the official wire to mobilize did not reach the Battery till 11 a.m. on the 2nd August owing to the amount of messages being transmitted on the main line. The men at Rawal Pindi had been medically examined for fitness for active service. On the morning of the 2nd August the horses were inspected by the O.C., R.A. and the Veterinary Officer and the various mobilization measures put in train. No move was expected for three or four days, but about 3 p.m. orders were received for the battery to start that night. The afternoon and evening were fully occupied packing and storing kits, inspecting ammunition, etc.

The right half battery left at midnight having entrained in just under the hour. The left half battery entrained immediately after but their train was delayed starting for the mail to go through. The first train reached Nowshera about 6 a.m. but the second did not arrive till midday. The guns were parked and the horses picketted in an open space in the British infantry barracks, the men bivouacking in the verandahs. The day was excessively warm.

Owing to the hurried start, the battery had no time to complete deficiencies from the supplying battery.

Seventeen men were on detachment in the Murree Hills. On the receipt of the order to mobilize, they had been wired for and thirteen of them reached Rawal Pindi the evening the Battery started; of the men in Pindi eight were left behind in hospital.

All horses irrespective of age or other faults unsuiting them for service which were not actually in the sick lines had to be taken. Nine were left behind sick. The men were as fit as could be expected after three months hot weather. The horses were fat and soft, having been doing light work on soft food, bran, boiled barley and a little grain.

The strength the Battery left Pindi was:—

5	Officers,
146	N.C.O.'s and Men,
9	Native Drivers,
58	Native Followers,
134	Horses.

At Nowshera, orders were received to push on. Twenty days rations for the men and five days rations for the horses were drawn. The latter not to be expended unless necessary, daily rations being drawn when available.

4th August.—The Battery marched to Hoti Mardan, 16 miles. It started at 3.30 a.m. and got in about 6.15 a.m., trotting a considerable part of the way as soon as it was light enough. The tents were not pitched, the men spending the day under some trees round the camp. The shade was not of the best but preferable to a single fly 160 lb. tent. Three or four men went down with touches of sun and one man nearly succumbed to heat apoplexy. Two had to be left behind sick.

5th August.—The battery marched to Jallala, 12 miles, starting at 2.30 a.m. and getting in soon after 5 a.m. (sunrise). A standing camp of E.P. tents had been pitched here, the heat was intense throughout the day. Eleven men were more or less knocked up by it, three being very bad indeed.

6th August.—The Battery left Jallala at midnight with a convoy, the progress consequently very slow. The Border is crossed about two miles out of Jallala. At 2 a.m. the battery halted for an hour to allow the convoy to close up. At 5.30 a.m. it reached the Dargai post (South Malakand) but could not get into the fort at once as an infantry battalion was just marching out and the place was full of transport animals. There were troughs outside filled by a pipe from the tanks inside the fort but the water was so warm the horses would not look at it even after the fourteen mile march on a hot stuffy night. They were eventually watered at a small village trough about half a mile off and then fed and the men got their breakfasts.

On arrival a wire was received from the Adjutant, R.A., Malakand Field Force, to say the Battery was not to halt on the Malakand but to go through to Khar and to join the 1st Brigade at Amandara.

The Dargai Fort was so crammed with transport, and so dirty, and the prospect of heat so bad (a regiment of Sikhs had lost eighteen men from heat apoplexy here two days before) that considering the telegram the Major determined to push on over the Malakand. The horses were again watered, and at 11 a.m. under a burning sun the battery started, followed by three tongas with sick. A short trot along the level and then the ascent commenced up the graded road made during the Chitral Campaign in 1895. The road is uniformly ascending and rises some 1,500 feet in six miles, above and below are precipitous slopes, and there is absolutely no shade. It was deep in dust and the battery marched with 20 to 30 yards distance between carriages. The heat was very bad and before reaching the top both men and horses were feeling it much. Three horses fell in their tracks dying almost at once and had to be thrown down the Khud. On reaching the pass, the road was found blocked with transport, and progress was very slow. Fifteen men had to be left in the hospital in the Fort suffering from the effects of the heat; two of them died next day. The descent to Khar is about four miles. A few dead bodies were to be seen on the road sides, the result of the fighting a few days before. Two more horses died just before getting in and one just after being unhooked and one more that night. Khar was reached about 3 p.m. There was good shade for the men to rest under with a stream flowing through it. Five other men were rather bad from the heat. For the night the men bivouacked around the guns prepared for action. No. 7 M. B. R.A. was on the left, and the 35th Sikhs were also there and picquetted the rear and flanks.

During the four days since the battery left Rawal Pindi, the commissariat had managed a daily supply of block ice, and it was undoubtedly due to this and the hard work of the surgeon and assistant surgeon that more cases of heat apoplexy were not fatal.

7th August.—The night's rest was disturbed by heavy rain at 2 a.m. for about two hours. At 7.30 a.m. the battery moved to Amandara (three miles). Many horses were still much done up. Three men left sick at the Malakand rejoined.

8th August.—The battery remained at Amandara. Eight more men rejoined from the Malakand. The next few days were spent quietly in camp at Amandara. The weather, however, was somewhat trying, extreme heat and pouring rain alternating. There was a plentiful supply of green jowar crop in the neighbourhood and the gunners and syces used to be sent out to cut and bring it in. There was also plenty of bhoosa. Doors from the ruined villages placed on tent pegs were used to make harness stands to keep it out of the mud. One morning too on a foraging party, some outriders of the battery brought in about twenty donkeys and twenty head of cattle. On the 12th August the country was declared friendly and forced requisition of forage stopped.

On the 12th August nineteen men and twelve horses joined from the 50th Field Battery.

On the 13th August, orders were issued for a forward move on light scale without tents, and all superfluous kit was sent back to Khar. Fortunately, the battery retained its tents (having made arrangements to send them to Khar before marching next day) as it rained so heavily that the move was postponed till the 16th when it was decided to go on rain or no rain.

16th August.—On the 16th August about midday the rain stopped and at 1 p.m. the brigade marched. The road was a rough country one and several detours through fields had to be made. The going was very heavy. The battery got into camp at Jhana about 5 p.m. and bivouacked. The camp perimeter was hastily entrenched. The Major went on with a quarter company of sappers and miners to inspect the road through Jhana village. The enemy were seen in force on the Landaki spur about four miles on.

17th August.—The six guns moved off at 6.45 a.m. but were considerably delayed at the entrance to Jhana village as the General's order was for the battery to go through in rear fearing it might block the only road. This was certainly very narrow and winding, requiring careful driving, but only one slight check occured. After clearing the village, the guns trotted for nearly three and a half miles along a rough, heavy road and came into action at 8.50 a.m.. The mountain batteries opened fire about five minutes before. The guns were in action on the low end of a spur running down from the hills, and the enemy in sangars with several standards on a spur facing it about 1,500 yards off. The hills and the two spurs formed a sort of horse shoe round a valley much intersected with nullahs. The enemy's right rested on the Swat River with only a narrow causeway between the precipitous end of the spur and the river. Two regiments of native infantry and No. 8 Bengal Mountain Battery went up our spur to attack the enemy's left across the hills at the top. The Guides Cavalry halted on our left, and the West Kent Regiment waited in rear of the guns to attack in front after the position had been shelled About 10 a.m., the frontal attack commenced, the guns continued firing over the heads of the infantry till they were well up to the position. The frontal attack met with very little opposition. In the meanwhile two wagons had been ordered up from Jhana and had reached the battery. At 10.40 a.m. the battery was ordered to limber up and return to Jhana where the baggage and escort were threatened by a gathering of the enemy on the hills above ; but these had cleared off before the battery got back as it was considerably delayed at Jhana village by transport blocking the road. After an hour's halt during which the men had breakfasts and the horses were watered and fed, the battery returned to Khar, reaching camp about 5.45 p.m. The ammunition expended was 132 rounds of shrapnel. The shooting appeared very good. The G.O.C. of the 3rd Brigade which was at Rustum near the Ambeylá pass wired a few days later to say he had received news stating that the "Bunerwals had suffered very heavily . . . . the effect of the guns is reported to have been remarkable."

During the next ten days whilst the 1st Brigade went into Upper Swat, the battery remained at Khar.

29th August.—The battery marched at 6 a.m. to Chakdara (about 8 miles). The horses had to be led singly over the suspension bridge there and the carriages unlimbered and run over by hand. The battery got in by 9.30 a.m., but it was late in the afternoon before the camels and baggage arrived and heavy rain fell during that time.

30th August.—The battery marched with Colonel Reid's column consisting of one native cavalry and two native infantry regiments to Uch where it remained five days in an entrenched camp.

General Wodehouse took over command from Colonel Reid. Orders were first received for the battery, on the advance of the column to return to Chakdara but it was afterwards decided to take the guns on.

4th September.—The guns (leaving the wagons at Uch under the Captain) marched at 5 a.m. with orders to halt at Serai (8 miles) for orders. The O.C. went on with the rest of the troops to investigate the practicability of the road, one company of native infantry remaining with the guns. After halting for an hour and a half at Serai, the battery went on. The road for about four miles was good, it then entered a narrow defile down to the Panjkora River, about two miles long. In one place an extra pair of horses had to be hooked in to each team to get the guns up.

The O.C. joined the battery here. Shortly afterwards in the middle of the defile, orders came for the battery to encamp in the first convenient spot, but the road being only from eight to ten feet wide, it had to go on to the bottom of the defile and halted about 11.45 in a small open space of level sand by the Panjkora River, about one and a half miles short of the bridge. There was no shade and the heat was very great. Orders were then received to return to Serai that evening as the causeway by the river to the bridge was considered impassable, but General Wodehouse, the G.O.C., came back, and after talking the matter over gave the order to go on. While halted here, some excitement was caused by a rumour from the front that the heights across the river and opposite the bridge, which was round a bend, were held by the enemy, and the guns were brought into action and holes dug for the trails so that they could cover the heights on the bank opposite to the place where the battery was halted; but the rumour proved a false one. The transport camels, which had been temporarily unloaded, were reloaded and the baggage sent on about 4 p.m., the hope being that they would be clear of the causeway before the battery got to it, but though the battery did not start till 5 p.m., on reaching the causeway about half a mile on, it found the transport all blocked and a delay of three quarters of an hour occurred due to the ambulance tongas which had stuck at a bad corner on the causeway. The gunners were sent on to the spot, and, with some of the escort, improved the road and manhandled the tongas across. They continued to work at the road whilst the camel transport walked along, but at this place teams had to be unhooked and horses led over singly, and the limbers and guns manhandled over separately. The rest of the causeway though requiring nice driving was safely traversed, but it was 7.45 p.m. before the last gun got into camp.

The battery was complimented in brigade orders by General Wodehouse "on the hard work and excellent driving which enabled them to bring their guns to a position it was considered impossible for them to reach." General Sir Bindon Blood also wired to the Inspector General of Artillery in very commendatory terms of the officer commanding the battery and the excellent way in which the men had worked. The battery remained at Panjkora for ten days, the horses profiting much by the rest. The wagons moved on to Serai. Unfortunately, two men were drowned whilst bathing in the river. Experiments were made for taking the guns and carriages across the narrow suspension bridge, by slinging them on short wooden axletrees between two wheels, but the road along the far bank was impassable.

On the 28th September the 2nd and 3rd Brigades went on into the Bajour country, the intention being for them to go through the Mohmand country to Peshawur.

14th September.—The guns marched back to Serai where a post on the line of communications had been formed, and where the wagons were. The bad place on the causeway had been built up, and there was no serious obstacle on the road except the narrowness of it which necessitated careful driving. After halting there one day, the guns were again sent forward to Panjkora owing to the rising of the Mamunds and the fighting resulting from their attack on the 2nd (General Jeffreys's) Brigade. The practicability of a ford having been established, on the 30th September the battery was ordered on to the Mamund Valley.

30th September.—The wagons came on from Serai and joined the guns. The battery forded the Panjkora River. The ford was deep and strong, eight horses were hooked into each carriage and the cartouches and cartridges were sent by the gunners round by the bridge.

The battery remained in camp at Kotkai, near the junction of the Jandol and Panjkora rivers, two days. The road on was reconnoitred.

3rd October.—Four guns and two waggons marched to Jhar (10 miles). It had been found best to leave the road for the greater part of the way and march in the sand or river bed. The remaining guns and wagons were left at Kotkai under the Captain.

4th October.—The four guns and two wagons marched to Mayat Killa (10 miles) in the Mamund Valley. It was fully expected that there would be a big fight at the upper end of the Mamund Valley against the villages of Agra and Gut, and a careful reconnaisance of position for field guns was made on the 5th and 6th under cover of the cavalry of strong foraging parties, which had slight skirmishes with the enemy both days. But the Politicals reported a tendency on the part of the Mamunds to come to terms, which they finally did, and terms being made no further fighting took place.

On October 6th a report was current in camp that 1000 Afghans had crossed the border into the head of the Mamund Valley, and a night attack was expected. During the afternoon, a large earth traverse with sacks of earth along the top was erected by the men between the gun park and the horses, but the attack never came.

13th October.—The force remained in camp at Mayat Killa till the 13th, when it retired to Jhar. The battery was with the rearguard but no interference was offered to the force.

The next day it marched to Mata Shah in the Salarzai Valley.

The Salarzai were not keen on fighting and contented themselves with sniping a little at nights and arguing about terms by day.

16th October.—A reconnaisance in force was made up the Valley. The guns only went out (with eight horses in each team,) and with the cavalry went as far as Pushat (about 8 miles off). Small gatherings of men were seen on the lower hills, but as they made no hostile demonstrations they were left alone.

20th October.—The Salarzai came to terms, and the force withdrew.

Six days marching brought the force back to the Malakand where it halted one day and then did two marches to Jallala just inside the frontier.

The greater portion of the Malakand Field Force with the Headquarters Staff remained in camp just within the Frontier for November and December. The site of the camp was twice shifted. Early in November there was a serious outbreak of influenza among the battery horses, almost all taking it in turn, and as many as seventy had it at one time. The symptoms were high temperature, off their feed, discoloured membranes, and hind legs much swollen. After the sickness had abated, they were kept in hard work doing four drill orders a week (six guns and six wagons being turned out with eight horses in each team and the remainder as outriders) and working for long mornings over fine open undulating country. The going, however, was rather heavy. During this period leave up to ten days was granted within twenty-four hours recall, and the O.C. accompanied an intelligence department reconnoissance of the passes into Buner and found that field artillery could get within nice range of three out of four of them.

2nd January, 1898.—The Force became the Buner Field Force and marched to Hoti Mardan. After halting there two days, the larger part of the force including the battery, made two marches to the foot of the Tungi Pass. A demonstration was also made against the Melandri and Ambeyla passes. The force camped about one mile from the entrance to the gorge up to the Tungi Pass. The pass was seen to be held by the enemy, and the C.O. went on with the range finders and reconnoitred the road up to and the position for the guns, which was close to the entrance of the gorge.

7th January.—The battery paraded at 8·30 a.m. and went straight to the position with its escort of one troop of the 10th Bengal Lancers and two companies of the Buffs. It opened fire on the enemy at 9 a.m. The enemy were posted in sangars all along the ridge above the gorge and on the left of it. The battery ranged successively on their various positions; the ranges varying from 2,000 to 2,500 yards. The angle of sight varied from 13 to 15 degrees. The guns had to be kept a little on the reverse slope of the position to get the required elevation. The frontage was somewhat limited, and the guns were at half interval.

The high angle of elevation apparently affected the volute springs as four or five failed to pull the guns back after firing, and it was necessary to lever them back with a handspike for several rounds. A steady fire was maintained on the enemy's position till 1.15 p.m., No. 7 Mountain Battery and No. 8 Bengal Mountain Battery also firing from a position on a ridge on the right of the gorge and more directly in front of the enemy's ridge; the Buffs also firing long range volleys from alongside the mountain batteries. The 20th Punjab Infantry made a detour up a very steep place to the left to turn the enemy's right. The Highland Light Infantry and the 21st Punjab Infantry attacked up the front slope to the position and the West Kent and the 16th Bengal Infantry went on up the gorge to the actual pass. At 1.15 p.m. the infantry began to show well up the steep slopes to the position and a very careful fire was kept up over their heads, the setting of the fuzes being especially carefully checked. The last round was fired at 1.45 p.m. The result of the fire was that our infantry gained the crest with very little opposition and only one casualty. Had the enemy not been kept away from the crest by artillery fire up to the last, a very few men could have caused incalculable damage merely by rolling down stones.

It was impossible to see if much damage was done to the enemy behind the crest but the fire undoubtedly accomplished its object in keeping down that of the enemy on our infantry during their very arduous ascent. The reverse slopes were found afterwards to be very steep. Many envelopes of shell were found four or five miles up the valley beyond.

The ammunition expended by the battery was 476 rounds of shrapnel.

The battery remained one day at the camp at the foot of the Pass and was then sent to Rustum, four miles from the entrance to Umbeyla Pass (two marches).

It remained at Rustum till the 17th January when it was sent back to Hoti Mardan and the next day to Nowshera where it remained six and on the demobilization of the force returned to Rawal Pindi by route march (six marches).

The battery reached its barracks on January 29th, just three days under six calendar months since it started. During the six months the men had been very healthy. At first, owing to the extreme heat, there were several cases of heat apoplexy, but nearly all returned to duty with the battery. Twenty-three men were sent back sick to the Base Hospital, of these five eventually returned to duty. One died of enteric fever. Two men died at the Malakand from heat apoplexy and two were drowned at Panjkora, as already mentioned. Three men were invalided home.

The total losses among the horses was seventeen. On getting back to cantonments the horses, though not exactly fat, were very fit as the scarcity of galls and casualties on the march home proved. Their coats were somewhat rusty in colour owing to the exposure to sun and rain. Nearly all had been clipped twice. Their rations had varied a good deal during the six months. Sometimes it would consist of plain barley or plain gram with no means available to crush or prepare it. In standing camps, if the gram was issued whole, it was generally soaked, but the barley was quite intractable and a very bad feed. The fodder, too, varied a great deal, when first the battery went into the Swat Valley, it was green rice crops or green Indian corn, afterwards at Panjkora and onwards it was generally bhoosa from stacks or baled, the green stalks of a sort of bean crop or almost ripe rice straw. During November and December it was generally baled hay, very good as a rule. Green rice crop proved a much less unwholesome fodder than one expected though it did cause a certain amount of diarrhœa amongst the horses. Great use was made of bhoosa by mixing it with the grain feeds, and the want of a large nosebag of the common English carter's fashion was much felt, the service one being much too small. On the whole the Walers stood the roughing it very well, undoubtedly the short cobby stamp proved the best to stand hard work and mixed feeding. There was no appreciable difference in the way the old and young horses did.

The battery has for the last four years been equipped with pole draft and found it most satisfactory. Nos. 4 and 5 always rode on the off lead and centre horses.

The carriages were Mark II with drag shoe brakes, the small supporting chains which fasten the shoe to the drag washers were found too weak and three or four broke in action. Six spare wheels seem an unnecessary number to carry. The wheels stood the wear and tear over very rough ground extremely well.

The case shot were found too weak to stand the jolting over heavy ground.

The packing up of horses and carriages with the men's kits and other heavy stuff in field service marching order is most undesirable. The guns and still more the wagons, even in drill order, are a very heavy load for the teams if the ground is heavy and in marching over broken ground or when no regular road is available. The battery always went in drill order if possible carrying only the picketting gear and sufficient grain for a feed on arrival in camp. Also all spare horses with harness were generally hooked in making the teams up to eight as far as possible.

The C.O. in his report on the equipment suggests subdivision carts capable of carrying 1,000 lbs., which would be sufficient to take the picketting gear, one day's ration for horses, horse clothing and men's kits at 10 lbs. each, thus easing the load on the guns and wagons and increasing the mobility and efficiency of the battery.

Owing to the necessity of not covering more ground than possible in camp, space was reduced to a minimum—the men either bivouacked, gunners in the gun park and drivers in the horse lines under waterproof sheet shelters, or when they had tents the tents were pitched in two rows between the gun park and horse lines, the gunners occupying the row next the guns and the drivers that next the horses.

The best method of picketting the horses was found to be as follows: a head rope to each subdivision and a heel rope per section. The subdivisions of a section being picketed outwards from the heel rope the harness being put down in front of the horses. Heel pegs are easily lost and broken and have no hold in sandy or boggy ground and wood is not always available to replace them.

Seventy-five yards front and one hundred and ten yards depth is about the smallest area a battery can conveniently camp in with tents, though by running the two waggons between the limbers of a section and the spare carriages between the section about forty yards less depth can be done with, but this makes the gun park very cramped.

THE SERVICES
OF
LIEUT.-COLONEL FRANCIS DOWNMAN, R.A.,
IN
FRANCE, NORTH AMERICA, AND THE WEST INDIES BETWEEN THE YEARS 1758 AND 1784.

EDITED BY

COLONEL F. A. WHINYATES, *late* R.H.A.

LIBRARY
SEP 19
PATENT OFFICE

PART III.

The capture of the Island of St. Lucia in 1778, and subsequent evolutions of the English and French fleets.

The season for active operations being over, it was decided to retain at New York only such a number of troops as were necessary for the defence of the different posts. An expedition of 5000 men was therefore despatched to the West Indies under General Grant. Captain Downman accompanied the artillery portion of the force, probably in special charge of the ordnance and engineer stores sent with the expedition, of which he has left an exact list which is appended. His experiences of the capture of St. Lucia are detailed in his journal as well as in a letter written to a friend. We prefer to give the letter as it contains the fullest account of the operations.

CHAPTER I.

The expedition sails for the West Indies. The troops land at St. Lucia. A French fleet arrives off the Island, and makes an attack upon the English squadron.

27th October, 1778. New York.

I embarked this day on board the *Friendship* ordnance store ship, under orders for an expedition to the West Indies, at least so conjectured. Captains Williamson's and Standish's companies are ordered for this service, both complete in men, 100 each. The officers are Captains Williamson, Standish, and Downman, Lieutenants Marlow,[1] Yorke,[2] Hamilton,[3] Edwards,[4] Todd,[5] Walker,[6] and Lock.[7] There are four ships belonging to the artillery, having on board the afore mentioned ordnance and stores. We have two sloops, on board of which are about 30 horses. The civil branch consists of a Commissary (Wood), Surgeon McLeod, Surgeon's mate Rollo, Clerk of Stores Mansfield, conductors, artificers, etc., etc., the whole under Captain Williamson.

Ten regiments of foot and fifty light horse are also embarked; the regiments are the 4th, 5th, 15th, 27th, 28th, 35th, 40th, 46th, 49th and 55th, each about 500 men. The whole expedition under the command of Major-General Grant.

The sea department is commanded by Commodore Hotham, and consists of the *Nonsuch* 64, the *St. Albans* 64, the *Preston, Isis* and *Centurion* of 50 guns each, the *Venus* frigate, and the *Carcass Bomb* with her tender, Lieutenant Garstin, and about 50 transports. Lieutenant Pitts commands the Engineer line.

On the 29th of October, the fleet fell down to Staten Island, where we remained till the 31st, when we went down near Sandy Hook and came to anchor. The wind now began to blow very fresh from the N.E., and sent in a heavy sea; the weather was very cold, thick, and rainy.

Orders for the ordnance ships by Captain Williamson
on board the *Lord Howe*,

28th October, 1778.

" The artillery on board each transport to be divided into watches and those on duty to furnish a guard and post the following sentries with side arms only, viz.: One at the cooking place to prevent fire. One at the door of the magazine, if powder or ammunition is on board. One at each gangway. The remainder of the watch to be constantly on deck, and are to be relieved every four hours. If an arm chest can be fixed on the quarter deck, twenty fire locks (or in proportion to the men on board) should be stowed in it, with a like number of cartouche boxes filled with ammunition. These arms not to be loaded, but kept ready to be used by the men on duty in case of any sudden emergency.

The officer commanding on board will order all the arms and ammunition to be examined every day, and the state they are found in to be reported to him. He must also take care that the arms are put so as to be easily got at upon all occasions when wanted. When the weather will permit, the men on board to be exercised. The commanding officer to order a non-commissioned officer to attend the delivery of all provisions and liquor for the troops, and whenever spirits are delivered out to them, that it is mixed with water, as two to one.

---

[1] Kane's List, No. 442.

[2] Kane's List, No. 464. Brigadier General Yorke, when proceeding to the Cape in November, 1805 in command of three companies R.A., was lost in the wreck of the *George* transport.

[3] Kane's List, No. 600.

[4] Kane's List, No. 490.

[5] Kane's List, No. 513.

[6] Kane's List, No. 520.

[7] Kane's List, No. 559

The men's berths to be visited every day to see they are washed and swept when the weather permits, and are sprinkled twice a week with vinegar.

The ports and scuttles of the transports are to be kept open whenever it can be done safely; of this the Master is the best judge.

The roll to be called twice a day upon deck in presence of an officer, who is to see that the men's hair has been combed, that they are washed and kept as clean as possible.

No smoking to be allowed between decks, nor lights of any kind except in lanterns, and these only in such fixed places as the Master shall think safe.

All fires and lights between decks to be put out at eight o'clock every night.

No fresh water to be used for washing during the voyage except by order of the Commanding Officer on board.

The Commanding Officer of each ship will get from the Master a copy of the daily allowance of provisions for the troops on board, as the men, women, and children are to be victualled agreeably to the instructions the Master of the transport has received from the Commissary General's office.

The men not to appear on any account in their regimentals, but to wear their canvas frocks and foraging caps.

A report to be made to Captain Williamson this evening whether the live stock and forage has been received agreeably to the order of yesterday, and if the military and civil branch are all embarked on board their respective transports."

(Signed) George Lewis Hamilton,

Lieutenant and Adjutant, R.A.

1st November.—The wind blew hard all last night, and continued so the whole day, also very cold and rainy. During the night the wind blew so violently that the men-of-war were obliged to strike their yards and topmasts, and a brig belonging to the fleet was almost driven on shore.

2nd November.—This morning is very cold, but the sky clear, and the wind blows strong from the north. Afternoon turned out very fine and the wind became moderate,

3rd November.—Very early this morning the fleet got under way and stood to the S.E. with a fair pleasant breeze.

4th November.—The wind began to freshen and before night blew strong, but continued in our favour. From this time till the 9th the wind increased much and occasioned a mountainous sea, so that our ship rolled and laboured prodigiously, more than ever I experienced before, which made it most uncomfortable to me who am always sick; perhaps the cause was our being very deeply laden with heavy articles. The *Solebay* frigate with nine vessels which had sailed with us thus far, took their leave and steered south. They are destined for St. Augustine and Pensacola, having on board for those garrisons a Hessian battalion and Allen's corps.

10th November.—The *Venus* frigate crowded sail ahead of the fleet. We supposed her sent on to the place of our destination to reconnoitre in that quarter and to give notice of our approach. From the 10th to 16th, moderate weather, from 16th to 23rd, perfectly calm and very hot. We are now in the lattitude of 26° 4'. From the 23rd to 29th quite calm, and very light winds and variable. This day we discovered a devil fish playing round our ship. He appeared to be about 15 feet from wing to wing. He had two sucking fish upon him one about two feet long, the other about a foot. These fish were quite white, and it seemed to us they gave him a great deal of uneasiness, for by the different attitudes the devil put himself into, we concluded he wanted to shake them off, which he very often did, but in an instant they were fixed on the same place as before. The devil was attended by a great number of pilot fish, such as are generally seen in company with the shark. We caught six of these with small hooks from the stem of the ship; they were about one foot long, very handsome, and exceedingly good eating. The devil fish is of a dark brown, with a lighter colour running in irregular stripes across his back, the belly and the whole of the under part being perfectly white. His shape has a near resemblance to the skate or stingray, differing only in the fore part where he has two arms or feeders or feelers about three feet long, which he makes great use of when swimming, turning them different ways, as if to see or feel for prey with, very often making their extremities meet together. He often turned himself on his side, and then on his back, and in this position exhibited a most beautiful appearance, which was very much heightened by the lively and variegated colours of the small fish that attended him. It was curious and entertaining to observe how fearful these little aides-de-camp were of losing the company of their general and guardian, for whenever they ventured to the stern of the ship they scarcely stayed a moment, and never came at all unless the devil himself swam near; when this was the case they made a sally from their garrison and attacked our baits with great voracity. I could not discover the situation of the eyes of the devil fish, but I imagine they are between the feelers. He has a long tail not unlike a coach whip which he whisks about with much dexterity when on the surface of the sea. These fish, notwithstanding their enormous size, will often throw themselves several yards clear of the water, and do not be surprised when I assure you that the fish above mentioned was not so long by several feet as some I have seen off the coast of Florida. He remained about our ship from early morning till late in the afternoon when a breeze springing up we lost him. During the fine calm weather we have had for many days, we have been much entertained with the variety and abundance of fish that have played about us. We caught some flying and other fish. I have taken a representation of the devil as he appeared in the sea at the depth I believe of six or eight feet, with a sucker on one of his feelers, and his attendants the pilot fish.

From this time to the 9th December nothing worth remarking happened except our losing both the artillery horse sloops, and a brig with horses belonging to the army. On this day in the afternoon we saw the island of Barbadoes. Twenty years are past since I was on this Island on an errand similar to the present one; whether we prove as fortunate as then time will determine. As it was late in the day our Commodore made the signal for the fleet to heave to, which they did, and remained so during the night.

10th December.—Early in the morning we filled our sails and stood for the Island which appears as beautiful and as pleasing to the sight as it did when last I saw it. Though my passage then was much longer than this, every yard we advanced towards it at that time I thought produced a new beauty, and now I think the prospect equally pleasing. The conveniences and comforts to be met with on shore are only truly enjoyed by people who have been confined a good while on board ship, and I could wish that a number of the good people of England who (though blessed with everything that is thought necessary to make life pass on agreeably) seem to be displeased and unhappy on shore, would take a sea voyage. Let them encounter hurricanes, seas mountains high, maggoty water, rotten bread, putrid beef and pork, and in short let them feel and be perfectly sensible of every danger and misery people at sea are subject to. When they have experienced some of these hardships, I may venture to pronounce that then, and only then, can they with a true appetite relish the many blessings and pleasures they day by day receive.

About noon the fleet came to an anchor in Carlisle Bay, but not till after a great deal of bustle and confusion occasioned by the ships all crowding together when going in, but no great mischief was done. Here we found Admiral Barrington with the *Prince of Wales* and *Boyne* men-of-war, and several frigates, among them the *Venus* which had arrived seventeen days before us. One of Admiral Barrington's frigates had just taken a French ship bound to Martinique having on board 300 soldiers, who are now prisoners in Bridge Town.

All this day and the 11th, we were busy on shore in procuring fruit and other necessaries for another trip. Every person belonging to the fleet was ordered to sleep on board their respective ships on the 11th, as we should absolutely sail on the 12th. At daylight the Admiral made the signal for the fleet to get under way, and by 8 o'clock the whole were ready to proceed, Commodore Hotham leading the van with his division of transports, Admiral Barrington with the centre and in the rear.

In this manner we continued going before a pleasant breeze till about sunset of this evening, when we saw the high land of St. Vincent at a considerable distance. The signal was now thrown out for the fleet to heave to with their heads to the northward; in this situation we remained all night carrying but very little sail.

On the morning of the 13th, we saw the Island of St. Lucia at a distance to leeward; we now knew this to be our destined port.

The morning being very thick and hazy prevented our bearing down till eight o'clock, at which time the clouds began to disperse, the sun showed his face, his countenance was clear and promised a fair day. I wish the island presented as fair an appearance, but far on the contrary it exhibits the most unsociable inhospitable aspect I ever saw, mountains piled on mountains in the most irregular and rugged manner you can conceive, and clouds perpetually hide their summits. When we had passed the north end of the island we were under its lee and the sea became smooth and pleasant. As we proceeded along the shore we saw many white flags flying on little batteries, many cannon were fired, and the Island seemed to have taken a general alarm. We continued along shore till we came to a bay called the Grand Cul de Sac; here the fleet came to an anchor, and instant orders were given for the troops to land. It was not till after the Commodore and several of our ships had dropped their anchors that a battery of four guns situated on a high rock at the entrance of the Cul de Sac fired a single shot. The Frenchmen were slow in their firing motions, but in the motions of their heels they were very active, for almost immediately after the Commodore brought his broadside to bear upon them and gave them a few shots they precipitately left their battery.

Before our arrival here the following orders had been given out by the Commander-in-Chief on board the *Preston*, 3rd November, 1778:—"Colonel Prescott, Lieut.-Colonels Sir Henry Calder, Bart. and Medows[1] are appointed Brigadier Generals on the expedition. Lieut.-Colonel Musgrave of the 40th regiment, Deputy Quarter-master-General; Major Brown, Deputy Adjutant-General.

The 4th, 15th, 28th, 46th and 35th regiments form the first brigade under the command of General Prescott, to which Captain Smith of the 5th regiment is major of brigade. The 27th, 49th, 40th, and 55th regiments form the second brigade under Colonel Sir Henry Calder, Captain Baker of 5th regiment being his Brigade Major. The grenadiers and light infantry and 5th regiment compose the reserve under General Medows, Lieutenant Ross of the 35th regiment appointed his Brigade Major. Major Harris[2] of 5th regiment commanding the grenadiers, and Major Sir James Murray of the 4th regiment the light infantry.

When the troops are ordered to disembark they are to take on shore one day's provisions cooked and half a pint of rum each man, and 36 rounds of ammunition only.

The detachments will be made in the following order, and the commanding officers are to take care that the troops get into the boats by companies. The grenadiers, light infantry, and 5th regiment with four 3-prs. are the first debarkation. The first brigade with two 3-prs. is the second, The 2nd brigade with two 3-prs. is the third, and the cavalry and artillery stores, etc., etc., constitute the fourth debarkation. The sick to be left in the care of the women, and no woman is to land on any account."

---

[1] Afterwards Sir Wm. Medows, Governor of Bombay.

[2] Originally in the Royal Artillery (Kane's List, No. 376). In 1788, Harris went to Bombay as secretary and aide-de-camp to Sir Wm. Medows. In 1799, when in command of the Madras army, he besieged and took Seringapatam. In 1815, he was raised to the peerage as Lord Harris of Belmont, Kent.

ARTILLERY ORDERS.—"The following officers are to take the command of the guns to disembark with the different brigades. Lieutenants Yorke and Edwards, with four non-commissioned officers and thirty-six men with four 3-prs., with the first debarkation. Lieutenant Todd, with two non-commissioned officers and eighteen men to the two 3-prs., with the second. Lieutenant Walker and two non-commissioned officers and eighteen men to the two 3-prs with the third. Captain Standish to superintend the second and Captain Downman the third debarkation."

Before all the fleet had come to anchor, and the flat and other boats necessary for landing the troops were hoisted out, the afternoon was very far advanced, however, General Medows' corps was ordered to land, which was effected on the south side of the bay, without the smallest opposition, after the *Venus* frigate had fired a broadside or two into the woods. They then proceeded by the head of the bay to the road leading to Morne Fortuné, where a few popping shot passed, but it was soon over, and they remained quiet the remainder of the night, though extremely uncomfortable for it rained almost the whole time.

General Medows issued the following order this day:—

"Brigadier General Medows is extremely sensible of the high honour conferred upon him in having the command of the flank corps. From the acts of gallantry in the light infantry, the determined bravery of the grenadiers, and the confirmed discipline of the 5th regiment success is to be expected, and he sanguinely hopes the lustre of their actions in the field will not be tarnished by any irregularities out of it. The troops are desired to remember that clemency should ever attend on victory, that an enemy in your power is an enemy no more, that to be cruel and brave are almost incompatible, and the glorious characteristic of a British soldier is to conquer and to spare; acting on these principles they never can fail doing honour to their king, their country and themselves."

14th December.—Early this morning the other part of the army landed and took post on the high hills on both sides of the Cul de Sac; they also took possession of Morne Fortuné, a very high commanding hill, on which are the Governor's house, ranges of barracks, an excellent hospital, a tank or receiver for water, and number of other buildings. When the light infantry first advanced to this hill they were fired at by a few straggling Frenchmen who were on the rising ground above the hospital. Their fire was returned, and at that instant Monsieur Bevuaux, surgeon of the hospital, going to the door to beg protection for the sick, received a ball in his head of which he died soon after. We were concerned for the unlucky fate of this gentleman for his death was accidental, so say the light infantry; however, be it as it will, he was pillaged of his watch and a considerable quantity of money he had put into his pocket for preservation.

General Medows advancing, descended to the town of Careenage situated at the head of a bay of the same name about two miles and a half to the northward of the Grand Cul de Sac. He proceeded and took post on the Vigie, a high commanding ground forming the north shore of the Careenage, which is a peninsula, the neck not more than 150 yards wide. A battery of three 12-prs. [No. 1] was found here pointing into the Choc Bay. The French had taken no pains to disable the guns they left on their batteries, except by putting into a few of them old nails and files which were soon taken out.

The 4th regiment was ordered to take post on these high grounds forming the south side of the Careenage immediately opposite the Vigie. In this space of ground were found four batteries with many of the guns unspiked and a good quantity of ammunition. There is a battery of two 12-prs. [No. 2] on a small detached rock (to which you ascend by a rope ladder). A little to the southward is another of three 12-prs. [No. 3] on the slope of a hill *en barbette*, commanding a small sandy bay on its left. A third one of five 18-prs. [No. 4] is strong and well made with embrasures and entirely of stone. This battery is well situated for the defence of the entrance of the Careenage, it is nearly on a level with the water, and about 200 yards from the rock battery. A fourth one [No. 5] of four 18-prs. is on the side of a hill very high and steep from the water, about a mile further up the harbour than the last mentioned one *en barbette*. There is also a well made stone battery on the opposite shore intended to protect the entrance of the Careenage, but this has no guns on it; this battery would rake the ship fore and aft that was firing at the five gun battery. The enemy did not attempt to defend any of these batteries, they only left a man on each, who at the approach of the English struck the white rag and ran off. They had several small cannon on Morne Fortuné, but made little use of them.

Every circumstance had hitherto turned in our favour as well as we could possibly wish; we were landed without loss, we are in possession of the enemies' batteries and strong ground, and nothing appears to be in the way to prevent the capitulation of the island in a day or two. But how uncertain are all human affairs, and how little ought we to depend on anything in this world, even the fairest appearances!

Our two commanders congratulated each other on the success of their endeavours hitherto, but little did they think what a storm was gathering over their heads at the very moment of their joy.

This afternoon two of our cruisers came into the fleet from the windward, firing guns and making signals for a fleet. In a very little time after, a numerous fleet was discovered standing from Martinique toward St. Lucia; half an eye was quite sufficient to distinguish it to be French composed of large men-of-war, frigates, and small vessels crowded with men.

I will leave you to form some idea of our thoughts and our situation at this moment. Gloomy as you probably think they were, I promise you most of us were in high spirits; our little army was tolerably well situated; our navy could not be so for they had not time.

The Comte d'Estaing, for it was no less a person, sent most of his small vessels into the Gros Ilot, a bay a few miles to windward of us, and cruised off and on with the ships of war till the morning. During the night Admiral Barrington made every preparation in his power to receive the Frenchmen handsomely and give them a hearty welcome. Our transports as you will readily suppose were lying in great confusion some on the inner and others on the outer side of the men-of-war; these were also lying in much irregularity when the enemy first appeared, but before Mons. d'Estaing did them the honour of a visit they were ranged in a line across the entrance of the Cul de Sac, had got springs on their cables, and presented their fair broadsides to Monsieur, an inviting prospect to a Frenchman when the odds were so much in his favour.

The French commander, however, merits the sincere thanks of every true Englishman for his politeness in not attacking us the instant he arrived when we were jumbled together in this great disorder. By not doing so he lost the fairest opportunity he ever had, and I hope ever will have, of conquering. Nothing but the interposition of Providence could have saved us if he had behaved as he ought to have done, and I have the vanity to think, had our situations been *vice versa,* destruction and ruin would have fallen on the head of Jack Frenchman.[1]

On the 15th, early in the morning, I received orders from General Grant to land immediately with all the artillerymen I had. Captains Williamson and Standish were at this time on board their ship the *Lord Howe,* that had been the whole night attempting to get into the Cul de Sac, but being an indifferent sailor and having but little wind, she had fallen much to leaward, and if the Admiral had not sent all his boats to her assistance this morning she would have undoubtedly been taken. When I had climbed and waded knee-deep through mud and clay to Morne Fortuné, the General ordered me down to a battery by the waterside. Thither I slid and tumbled through roads worse if possible than that to the Morne. From thence I could see the whole fleet of d'Estaing, all his small vessels in the Gros Ilot, his line of battleships ranging themselves in order, and coming down along the shore toward us. We were ready to receive him before he approached. About 11 o'clock he passed our batteries at the Careenage. I saluted each as they advanced, but they were too far distant to fire at with any certainty of striking, yet some of them were struck. They returned the fire, particularly the *Languedoe* with 42-prs., but it was so wildly that it was hard to determine at what they aimed. On their getting near to our men-of-war they were again saluted by a battery of four 12-prs. [No. 6] the same that fired when we first entered the Cul de Sac. The enemy had spiked these guns, but on the night of the 14th they were made fit for service by Lieutenant Garstin who now commanded the battery, and who was of so much service to Admiral Barrington during the engagement that he publickly gave him thanks.

When the enemy's ships were nearly opposite to this battery they bore away in a parallel to ours, and now commenced a glorious thundering cannonade from the English and a no less tremendous fire from the French, which continued without the smallest apparent interruption till their fleet, which consisted of eleven line of battle ships, among them two of 84 or 90 guns each, had passed in regular succession. After going before the wind till quite out of reach of our cannon, the enemy hauled their wind and stood towards the Gros Ilot.

---

[1] Twenty years later Nelson demonstrated the soundness of this opinion at the battle of the Nile.

Every British heart was beating with transports of joy, and defied d'Estaing even should he come again with double the number of ships. We were soon informed that our fleet had received no damage, nor had they any men killed.

In the afternoon about 3 o'clock, the French admiral had got far enough to windward to form his fleet in the same order of battle as in the morning. In this order he again came on with twelve ships. He was again received with the warmth of all our hearts, and again was he driven away, notwithstanding he and his officers had dined, and had taken *sans doute* an extra bottle. It was this bottle I believe that spirited several of them to venture nearer than they did in the former attack, by which some of their ships were a good deal disabled in their rigging and hobbled but lamely from the combat.

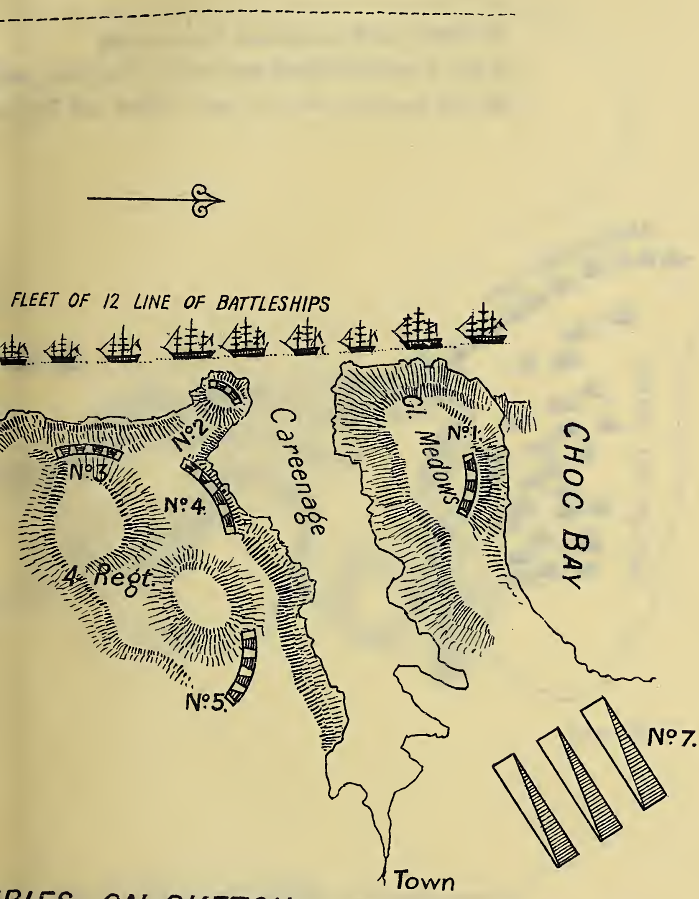
This rough true English mode of treatment so displeased our Frenchmen, already I fancy devilish sick with noise and smell of sulphur, that they determined both for their own welfare and from the regard they generally pay to their master's ships, not to adventure another attack. Had Byron arrived at this fortunate juncture, no longer should we call him the unfortunate Byron.[1]

---

[1] Vice Admiral Byron had sailed from North America with the object of taking part in the expedition to St. Lucia, but most of his ships were so damaged in a storm that he was forced to put back.

(*To be Continued.*)

1778, BETWEEN THE FRENCH FLEET UNDER UNDER ADMIRAL BARRINGTON.



RIES ON SKETCH.

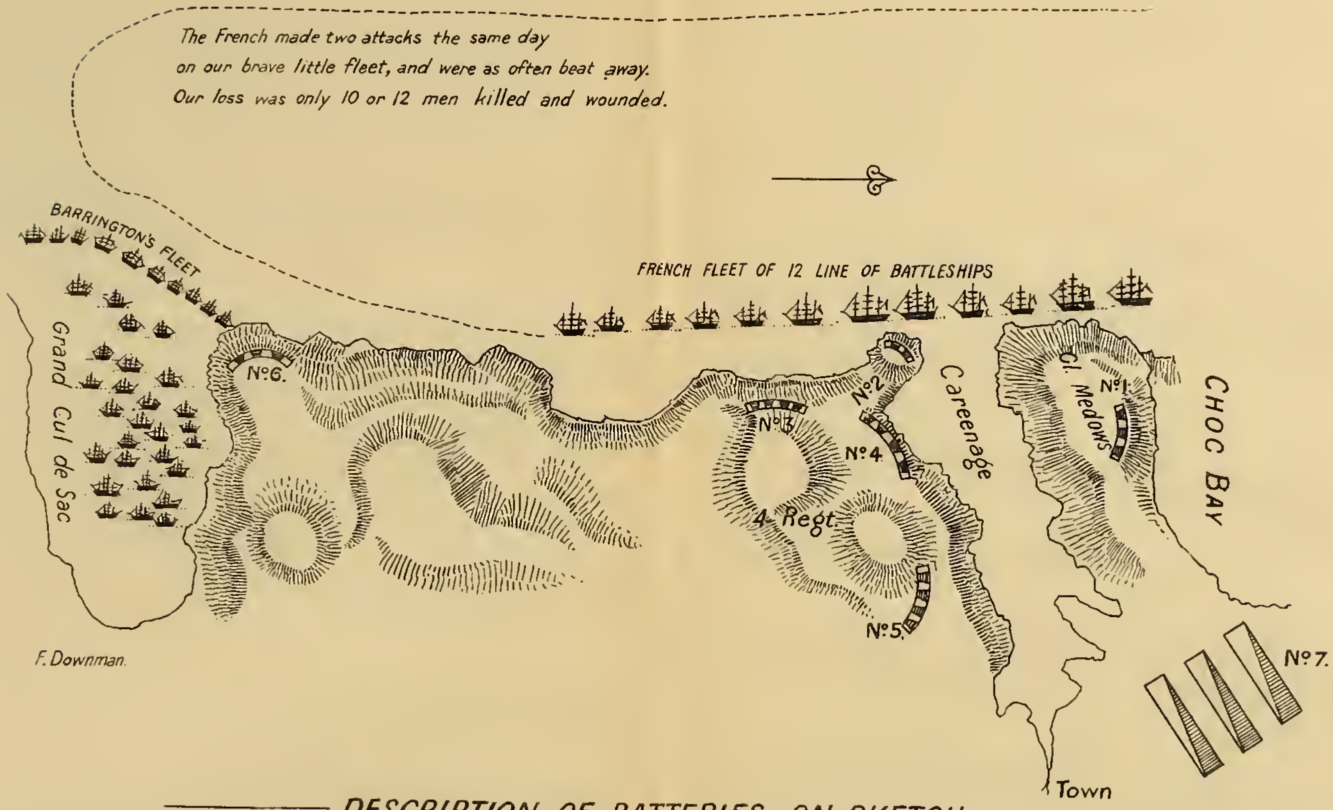
Nº 4 ...... Four 18 Prs on Water's edge at Entrance to Careenage Harbour, Captain Downman's post, on the 15th

º 5 ...... Four 18 Prs on Hill side, Captain Downman's post on 18th

º 6 ...... Four 12 Prs at mouth of Grand Cul de Sac, Lieut. Garstin's post on 15th

º 7 ..... French Columns of Attack on 18th.

A SKETCH OF THE ACTION OF THE 15TH DEC^{R} 1778, BETWEEN THE FRENCH FLEET UNDER THE COUNT D'ESTAING, AND THE ENGLISH FLEET UNDER ADMIRAL BARRINGTON.



The French made two attacks the same day on our brave little fleet, and were as often beat away. Our loss was only 10 or 12 men killed and wounded.

DESCRIPTION OF BATTERIES ON SKETCH.

N°1 Three 12 P^{rs} firing into Choc Bay. On 18th December, under Lieut. Walker, caused heavy loss to French Troops.
N°2 ...... Two 12 P^{rs} on detached Rock.
N°3. ... Three 12 P^{rs} en Barbette, commanding Small Bay.
N° 4 ... Four 18 P^{rs} on Water's edge at Entrance to Careenage Harbour, Captain Downman's post, on the 15th.
N° 5 ..... Four 18 P^{rs} on Hill side, Captain Downman's post on 18th.
N° 6 ... Four 12 P^{rs} at mouth of Grand Cul de Sac, Lieut Garstin's post on 15th.
N° 7... French Column's of Attack on 18th.

A SKETCH OF THE ACTION OF THE 15

THE COUNT D' ESTAING, AND THE ENGLIS

The French made two attacks the same day
on our Brave little Army [illegible] were as often beat
Our loss was only [illegible] 12 men [illegible] killed and w
Grand Cul de Sac

DESCRIPTION OF

No 1 Three 12 Pds firing [illegible] 15th December
under Lieut. Walker, [illegible]
No 2 Two 12 Pds on detached [illegible]
No 3 Three 12 Pds on Barbette commanding [illegible] Bay

APPENDIX.

SPECIES OF STORES.

A proportion of ordnance and ordnance stores ordered from New York for an expedition to the West Indies under Major-General Grant. The troops on this service consist of two companies of the Royal Artillery—two hundred men. Ten British Regiments about 5,000 men.

New York, 20th October, 1778.

ing s Heavy	24-pr.	Brass	12
		Iron	6
powder*	3	...	900
	To wood bottoms only 3-prs.		304
Hooks.	Hand for shells of sorts, prs.		12
	Slung with hood beams ...		6
	Square... ...		3
	Triangle ...		3
Iron.	Cutting for sod wads.	24	2
		12...	2
	Of sorts—tons		1
	Priming		69
Junk for wads—tons			50
Jacks—ordnance			4
Keys.	Fowlocks ...		100
	Spring		20
Kettles.	Camp with frying pan covers.		
	Kitt with trivet of iron		1
Knives.	Cutting		48
	For fuses with blocks ...		2
Lanthorns.	Muscovy ...		12
	Tin		12
	Dark		20
Limbers spare, congreves, shafts.	24		1
	12		1
	6		1
	3		1
Line Hambro-skeins			100
Locks pad for travelling mag....			12
Linstocks.	With locks ...		8
	Without ...		72
Linch pins, spare			20
Marline tarred, skeins			30
Match.		Slow, lbs. ...	50
	Quick.	Cotton, lbs...	60
		Worsted 〃 ...	3
Measures, Copper sets,	24		1
	12		1
	8 lbs to ¼ oz.		1
Tents complete.	Field officers.		
	Officers ...		
	Laboratory ...		1
	Horseman's...		
	French		
	Bell		
Tubes tin—fixed			6000
Tools sets	Miners		
	Carpenters ...		
	Coopers ...		
	Collar-makers		
	Smiths		
	Wheelers ...		
	Tinmans ...		

Vinegar white wine quarts			8
Wall pieces			6
Na		Clout...	2
		Dog	1
		Horse	14,000
		Copper	500
Plank battery feet super. 10-inch plank		...	1,414
Paper Reams.		Fine	121
		Cannon	2
		Brown	4
Pack threads, lbs.			100
Pails			20
Pikes for chevaux-de-frise			20
Powder.		Corned whole barrels ...	2,500
		Mealed, lbs.	50
Pins, tug, spare			12
Perpendiculars, new pattern... ...			4
Pincers for drawing fuses			2
Portfires, dozens			130
Petre, salt, lbs.			30
Plummets...			20
Pickets park			100
Punches for vents			60

ENGINEER DEPARTMENT.

Sand bags different sizes ... ...
Ballast baskets. ... ...
Balks of 9″ by 9″, 18 ft. long ...
Other timber 25 〃 ...
Canvas ... ...
Helves for pick-axes ... ...
Mantlets ... .
Battering plank ... ...
Saws. Pitt ... ...
Saws. Cross cut... ...
Saws. Hand ... ...
Scaling ladders ... ...
Files for saws... ... ...
Axes, hand ... ...
Wheel-barrows ... ...
Earth rammers ... ...
Hand-bills and hatchets ... ...
Mauls ... ...
Shovels ... ...
Spades ... ...

---

* It is noticeable that at this date a cartridge containing shot and powder was in use for 6 and 3-pr. guns—one of the features in modern quick-firing guns,

‡ Wheel harness.

§ Leather straps for binding loads on beasts of burden.

SPECIES OF STORES.

A proportion of ordnance and ordnance stores ordered from New York for an expedition to the West Indies under Major-General Grant. The troops on this service consist of two companies of the Royal Artillery—two hundred men. Ten British Regiments about 5,000 men.

New York, 20th October, 1778.

On travelling carriages	Heavy	24-pr. Brass	12
		24-pr. Iron	6
		12-pr. Brass	8
		12-pr. Iron	6
	Light	6-pr. Brass	1
		3-pr. Brass	8
	Howitzers	8-inch	4
		5½ "	6
Mortars on Their Beds		13 inch Long	1
		13 " Short	2
		10 "	2
		8 "	6
		5½ "	12
		4⅖ "	12
Ladles with Staves		24-pr.	18
		12 "	14
		6 "	4
		3 "	8
Wad Hooks	Long.	24 "	18
		12 "	14
	Light.	6 "	1
		3 "	8
Hand-spikes		Common	144
	Traversing. Light.	6-pr	8
		3 "	16
	Traversing. Howitzers.	8-inch	8
		5½ "	12
Boat, 4-oared			1
Bottoms of wood 13-inch			135
Brushes for kitt			7
Barras yards			20
Boxes.		For tubes	76
		Copper Salting	20
		Quick match	4
Callipers, brass			1
Caps, muzzle for mortars.		13-inch	3
		10 "	2
		8 "	6
		5½ "	12
		4⅖ "	12
Carcasses fixed.	Rounds.	13 "	100
		10 "	100
Carts.		Forge complete	2
		Ammunition	—
		Sling	2
Draught chains, Pairs.		24-pr.	16
		12 "	14
Carriages.	Travelling spare.	24 "	1
		12 "	3
		6 "	1
	Garrison	24 "	8
	Devil		1
	Truck		1
Cartridges. With powder.	Flan'nel	6-pr.	12,000
		3 "	2,400
	H'wtz.	8-inch	600
		5½	300
	Ball paper.	Musket	500,000
		Carabine	28,000
Cartridges. Empty.	Flan'el	24-pr.	4757
		12	6441
		6 "	600
		3 "	1200
	Paper.	24 "	9543
		12 "	7550
		6 "	1000
		3 "	1000
	Flan'el	8 "	1200
		5½ "	1800
Chests.	Laboratory with padlocks and keys		16
	Iron for paymaster		1
	Surgeons with	Medicine	1
		Instruments	1
Chevaux-de-frise complete			30
Cloths.	Oil.	Large	6
		Small	12
		Hair	15
Coal-sea-chaldrons			2
Coats, watch			—
Crows of iron			20
Couples for chain traces			500
Clouts of sorts			60
Capstan with bars, complete			1
Canvas for caping fuzes, yards			50
Cartouches of leather.		24-pr.	18
		12 "	14
		6 "	1
		3 "	8
	Howitzer.	8-inch	1
		5½ "	6
Composition lbs.		Portfire	100
		Fuzes	50
Candles spermaceti box			1
Quadrants brass			3
Rope coils.	Tarred.	7-inch	1
		5½ "	1
		4½ "	3
		3 "	3
		2½ "	2
		2 "	3
	White.	3½ "	2
		2½ "	2
Rasps half round			12
Rockets ½ lb each			12
Searchers with reliefs and pickers			2
Spike.	Nails for platforms.	8-inch	600
		7 "	6000
		6 "	2000
	For guns		200
Saws, tenon			4
Sheepskins, dozen			20
Shells empty.		13-inch	600
		10 "	800
		8 "	2400
		5½ "	4800
		4⅖ "	6000
Shells fixed		5½ "	300
Shot. Round.	Loose.	24-pr.	15,300
		12 "	11,900
	Boxes of 100 each 1lb		106
	Fix'd to wood bottoms and flannel cartridges filled*	6-pr.	900
		3 "	900
	To wood bottoms only 3-prs.		896
Shot. Case.	Fixed to wood bottom.	24-pr.	200
		12 "	200
		5½-inch	300
	Fixed with powder*	6-pr	300
		3 "	900
	To wood bottoms only 3-prs.		304
Hooks.		Hand for shells of sorts, prs.	12
		Slung with hood beams	6
		Square	3
		Triangle	3
Iron.	Cutting for sod wads.	24	2
		12	2
	Of sorts—tons		1
	Priming		49
Junk for wads—tons			50
Jacks—ordnance			4
Keys.		For locks	100
		Spring	20
Kettles.	Camp with frying pan covers.		
	Kitt with trivet of iron		1
Knives.	Cutting		18
	For fuses with blocks		2
Lanthorns.		Muscovy	12
		Tin	12
		Dark	20
Limbers spare, congreves, shafts.		24	1
		12	1
		6	1
		3	1
Line Hambro-skeins			100
Locks pad for travelling mag.			12
Linstocks.		With locks	8
		Without	72
Linch pins, spare			20
Marline tarred, skeins			30
Match.		Slow, lbs.	50
	Quick.	Cotton, lbs	60
		Worsted	3
Measures, Copper sets,		24	1
		12	1
		8 lbs to ½ oz.	1
Tents complete.		Field officers.	
		Officers	
		Laboratory	1
		Horseman's	
		French	
		Bell	
Tubes tin—fixed			6000
Tools sets		Miners	
		Carpenters	
		Coopers	
		Collar-makers	
		Smiths	
		Wheelers	
		Tinmans	
Vinegar white wine quarts			8
Wall pieces			6
Weights brass 4 lb. pile sets			3
Whetstones			12
Waggons, ammunition			8
Wheels spare.		24-pr.	8
		12 "	6
		6 "	2
		3 "	4
Washers of sorts, spare			20
Whips cart			50
For the armorers.		Standing vices	16
		Anvils	2
		Bellows, pairs	2
		Chests with tools	2
		" with lathe and wheel	1
		Walnut plank for stocking	14
Sponges with staves, rammer, heads and painted bags.	Long.	24-pr.	30
		12 "	
	Light.	6 "	8
		3 "	16
	Howzr.	8-inch	8
		5½ "	12
	Mortar.	13 "	10
		10 "	8
		8 "	12
		5½ "	16
		4⅖ "	16
Adzes, copper			2
Aprons of lead.		Guns	44
		Mortars	35
		Howitzers	10
Spare axle-trees bind.		24-pr.	3
		12 "	3
		6 "	1
		3 "	—
Budge-barrels copper hooped			18
Bellows for proving shells			2 pairs
Iron blocks with brass sheaves.		Treble	2
		Double	2
Blocks wood large.		Treble	2
		Double	2
		Single	2
Leading		Small	2
Deals, boards			150
Drag ropes pairs.	Light.	6-pr.	1
		3 "	8
		5½-inch	6
Files half round			24
Flax, pounds			40
Forms with knives for cutting fuses			2
Flag, Union			1
Flints.		Musquet	60,000
		Carabine	6,000
		Wall piece	100
Wood formers for the 24-pr, to the carabine			
Funnels.	Copper for filling shells.	13-inch	2
		10 "	2
		8 "	2
		5½ "	4
		4⅖ "	4
	Plate of sorts		2
Fuzes fixed.		13-inch	700
		10 "	900
		8 "	2,600
		5½ "	5,800
		4⅖ "	6,200
Grates for heating shot complete			2
Grease, firkins			10
Grindstones with troughs			2
Gyns, with blocks and falls			3
Gimblets of sorts, spike and small			24 doz.
Hammers			80
Hides tanned			20
Horns powder			30
Handscrews or jacks			2
Hand grenades fixed			500
Harness.	Horse.	Thill‡	67
		Trace	600
		Bit halters	667
		Wantys§	67
	Mens, 12 to a set; sets		51
Hand crow levers			72
Helves for pickaxes			
Lead balls for		Musquet, tons	20
		Carabine, tons	3
		Wall piece, cwt.	1
		Buck, tons	12
Shoes, horse			1,000
Scrapers for shells.		13-inch	3
		10 "	3
		8 "	3
		5½ "	1
		4⅖ "	3
Scales small			3
Scissors			70
Sieves, hair			1
Soap, firkins			1
Spirits of wine, quarts			8
Stationery boxes.		Comdg. officer	1
		Commissary	1
Steel, cwt.			5
Sticks, portfire			120
Tampions with collar.		24-pr.	18
		12 "	11
		6 "	4
		3 "	8
		8-inch howitzer	1
		5½ " "	6
Tacks, sponge			20,000
Tin sheets			1,000
Tallow, lbs.			112
Tarpaulins.	Light.	6-pr.	4
		3 "	8
	5½-inch howitzer		6
Thread or fine twine, lbs.			250
Tilts wadmill			20
Trees swingle for waggons, spare			20
Machine for drawing fuses			1
Mallets and setters each.		13-inch	6
		10 "	6
		8 "	12
		5½ "	16
		4⅖ "	16
Moulds for portfires, sets			1
Mantlets, new pattern			5
Nails.	Casks.	40 penny	1
		30 "	1
		20 "	2
		10 "	2
		6 "	2
		4 "	1
		Clout	2
		Dog	1
		Horse	14,000
		Copper	500
Plank battery feet super. 10-inch plank			1,414
Paper Reams.		Fine	121
		Cannon	2
		Brown	4
Pack threads, lbs.			100
Pails			20
Pikes for chevaux-de-frise			20
Powder.		Corned whole barrels	2,500
		Mealed, lbs.	50
Pins, tug, spare			12
Perpendiculars, new pattern			4
Pincers for drawing fuses			2
Portfires, dozens			130
Petre, salt, lbs.			30
Plummets			29
Pickets park			100
Punches for vents			60

ENGINEER DEPARTMENT.

Sand bags different sizes ... ...
Ballast baskets, ...
Balks of 9" by 9", 18 ft. long ...
Other timber 25 " ...
Canvas ... ...
Helves for pick-axes ... ...
Mantlets ... ...
Battering plank ... ...
Saws. { Pitt ... ... / Cross cut... ... / Hand ... ...
Scaling ladders ... ...
Files for saws ... ...
Axes, hand ... ...
Wheel-barrows ... ...
Earth rammers ... ...
Hand-bills and hatchets ... ...
Mauls ... ...
Shovels ... ...
Spades ... ...

---

* It is noticeable that at this date a cartridge containing shot and powder was in use for 6 and 3-pr. guns—one of the features in modern quick-firing guns.

‡ Wheel harness.

§ Leather straps for binding loads on beasts of burden.

QUICK-FIRE GUNS FOR FIELD ARTILLERY.

A DISCUSSION OF THE ESSAYS REWARDED AND PUBLISHED
IN THE
'DUNCAN' GOLD MEDAL COMPETITION, 1898.

J. F. R.

Held at the Royal United Service Institution, Whitehall, Wednesday, 13th July, 1898.

MAJOR-GENERAL J. F. MAURICE, C.B., IN THE CHAIR.

LIEUT.-GENERAL THE RT. HON. LORD METHUEN, K.C.V.O., C.B., C.M.G.:—General Maurice, before the discussion begins I wish to say on behalf of the Council of which I am Chairman that it gives us extreme pleasure to welcome the Royal Artillery Institution here. There is no body of men who recognise more than we do, the harm that is done perhaps to attendance at lectures here by reason of the many successful lectures at the Institution at Woolwich, and also at the Institution at Aldershot, and I am certain that no body of men are more pleased to suffer in consequence. I may also say with regard to the subject of discussion to-day that it is one that carries immense interest with the British public. Rightly or wrongly there is a feeling among a great number of us that steps should be taken to bring forward the quick firing gun. Whether that opinion is right or wrong I do not wish to say now, but I feel perfectly certain that to the British public it is an immense advantage that a subject such as this should be discussed in this Institution, and that they may have the benefit of reading opinions of men so capable of giving an opinion as they will read in to-morrow morning's papers.

THE CHAIRMAN:—Major Abdy has a letter to read first of all.

MAJOR A. J. ABDY, R.A.:—I have a letter from MAJOR F. B. ELMSLIE, R.A., the winner of one of the Silver Medals, written by him on the way to Egypt, where he is going in command of a howitzer field battery. He left England in such a hurry, going on service, that he was not able to say all he wished to say then, but he has written to me from Gibraltar, as follows:—*(Reading the letter)*

The Essays were restricted to the advantages and disadvantages of a Q.F. armament. The question of the organization and training suited to such an armament could only be referred to incidentally—yet it is imposssible to have thought at all about the subject, without feeling that the mere introduction of a gun of improved pattern is but a small part of the great change which will be necessary, if the full value is to be got out of such a gun.

Moreover the matter is pressing, as, even if a Q.F. armament were decided upon at once, it would take three or more years to construct and issue, while the training to its use of the personnel, would not be done in a day. It would thereupon seem very desirable to think the matter out at once. One great work has undoubtedly been done in this matter, in France, and if we with our old-fashioned guns, were called upon to stand up to a similar number of the modern Q.F. guns, there might be a crushing disaster.

It is to be hoped then that it will very shortly be decided that a Q.F. armament is to be adopted.

I would submit, should this be happily settled, the three following points require settling :—

(a.) What should be the relative proportions of batteries and ammunition columns, and what should be the organization of each of them.

(b.) What exact pattern of gun, carriage, &c., should be adopted, and

(c.) What changes in tactics, both on the part of our enemy and ourselves, must be looked for. This would be a guide as to the requirements.

It seems to me that all these things should be taken on at the same time and as having a relation to one another.

Would it come within the scope of the discussion on these essays to suggest that the above points be brought forward with a view of eliciting opinions as to whether all these points could not be discussed separately and simultaneously by three of the strongest possible Committies, the results being welded together so to speak by a Grand Committee composed of the Presidents and Vice-Presidents of the inferior Committees and presided over by some one of the highest rank. I suggest this merely as a method by which all the aspects of the question would be sure of receiving the attention that they merit.

For example. Suppose the Committee for *(a)* (organization and relative proportions) to consist chiefly of officers who are, or have been employed at head-quarters, under say I.G.O. as President.

Suppose Committee for *(b)* (pattern of gun, &c.,) to consist of the existing Ordnance Committee, assisted by the strongest possible Field Committee, comprising the Aldershot and Okehampton authorities—all trials to be carried out at Aldershot and Okehampton and as much under service conditions as possible.

Suppose Committee for *(c)* (Tactics, &c.,) not to be confined to R.A., but to include senior officers of other arms who have commanded troops in the field say under the presidency of Lord Roberts.

And suppose that when each of them has finished its work the three respective Presidents met together and drew up a definite report; such a report ought to be of the very highest value, and if acted upon, as one would hope it might be, ought to give our Artillery an excellent fresh start.

Of course you know what seems the logical outcome of a Q.F. equipment, viz., a considerable number of light Field columns for Ammunition Supply. These of course will be a practical difficulty, as they will not be popular. But if the thing is to succeed they would have to be created, and to be made popular by being made a recognized road to advancement—nor merely dumping grounds for officers otherwise useless. Of course all this ought to be considered before taking the plunge. It certainly seems that the future increases to the R.A. should take the form of columns rather than of batteries, if a Q.F. equipment be introduced.

MAJOR H. B. JEFFREYS, R.A.:—I do not propose to follow the essayists in the establishment of the truth of certain propositions pertinent to this subject, for few will deny their soundness. These propositions are—

(1.) At certain periods of a battle, just as the magazine rifle is superior to the single loader, so is the quick firer of equal power superior to the present field gun.

(2.) Power of rapid fire does not necessarily involve waste of ammunition.

(3.) Expenditure of ammunition is easily controlled in the artillery and can be suited to the supply available.

Nor will I take up your time by discussing the question of how the necessary ammunition can best be supplied, which problem has been fully treated by the essayists; nor will I touch upon the advantages claimed for four as compared with six gun batteries. These are side issues. If quick firing guns are found to be desirable, sufficient ammunition to enable full advantage of their power to be taken must and will be provided. And the number of guns in a battery may be decided on other grounds than that of efficiency of fire, all important though it be.

It is evident that if inventors and the manufacturing departments can give us a gun equal in power to and capable of delivering a fire double or treble that from our present field gun, artillery will have made an enormous advance.

But how is power to be defined? Up to 1871 the power of field guns depended upon the bursting charge of their shells; now it depends upon the number of bullets which can be released in a given time from the shrapnel which contain them, provided always that such bullets have sufficient weight and, when released at ranges up to 4,000 yards, have sufficient remaining velocity to disable a man.

Our experts have fixed the necessary velocity at about 700 ft. secs., and the necessary weight at about 35 to the lb. Now as our 14·1 lb. shell contains 210 of such bullets and our 12·5 lb. shell only 162 bullets it is obvious that if the weight of the shell is to be much reduced in the quick firer owing to the necessity for diminishing the shock of discharge, the destructive effect of which upon the carriage is very great if all recoil be prevented, the rate of fire must be much increased if the quick firer is to have an appreciable superiority; and this is well brought out by Major Inglefield.[1] Let us see what are the points of a Q.F. Major Elmslie says[2]—

1.—A rapid breech action.
2.—Fixed or simplified ammunition.
3.—No recoil.
4.—Sights not to require removal.
5.—Layer to be undisturbed by loading or recoil.
6.—Layer to lay and traverse.
7.—Firing to be by trigger or short lanyard.
8.—Percussion fuze only to be used when great haste is needed.

But these points are nearly all equally applicable to an improved type of field gun—

1.—A rapid breech action certainly is.
2.—So is any simplification of ammunition; that fixed ammunition is objectionable is shown by Majors Elmslie and Inglefield, Captain Barlow and Lieutenant Buckle.
3.—Absence of recoil is peculiar to the Q.F.
4.—Sights have been tried and probably will be adopted for our field guns, which do not need removal.
5.—Our system of opening and closing the breech does interfere with the layer, but there is no reason why that system should not be modified. To lay undisturbed by recoil is peculiar to the Q.F.
6.—Traversing saddles worked by the layer have been tried and given up by field artillery. They are necessary in the case of quick firers as the trail digs into the ground and traversing by the trail is difficult.
7.—But the traversing arc must be small, as no carriage would stand strain of recoil directed across carriage. Captain Barlow says 6° is feasible, presumably 3° each way. In the case of hostile cavalry working rapidly round a flank difficulty and delay would ensue.

7 is equally applicable to field guns.

It is therefore apparent that a quick firer must differ from a field gun in there being a total absence of recoil (an advantage), and in a traversing saddle being necessary (a disadvantage); in all other respects the quick firers proposed differ from our existing type of field gun, but not from that field gun as it might be improved. And this is where the comparisons drawn in the essays appear misleading.

Let us now see what rate of fire is claimed for quick firers.

Major Elmslie says that from four to five rounds per gun per minute; Major Inglefield thinks six to possibly eight; Captain Montgomery fixes five as a fair estimate; Captain Barlow considers three if fuzes to be set, and five if prepared before; Lieutenant Buckle under the same conditions puts the number at four or eight.

---

[1] Page 313, No. 7, Vol. XXV. R.A.I. 'Proceedings.'

[2] Page 288, No. 7, Vol. XXV. R.A.I. 'Proceedings.'

What is our present rate? Statistics of practice camps show that one round per gun per minute is our present rate of battery fire, or two rounds of section or magazine fire when the fuzes have been set and ammunition prepared.

The figures given by Major Inglefield[1] show that a rate of over three rounds has been attained during magazine fire, but this rate probably could not be kept up for more than a few rounds. Now in comparing these estimates we must remember first that the rates claimed by inventors represent, in the main, results attainable by single guns, with skilled detachments, on favourable platforms, with any targets, firing as rapidly as possible. It is entirely fallacious to compare such results with the rate of fire which can be kept up in battery, under service conditions, and with due regard to the maintenance of fire discipline. Every practical gunner will agree that independent rapid fire can only be kept up for very limited periods, as in our "magazine" or "section" fire, without rendering the detachments so unsteady that the shooting will become inaccurate and ineffective. Fire must be regular and must be controlled and to obtain these conditions some rapidity may have to be sacrificed.

Secondly, we must remember that it is unfair to allow quick firers credit for all recent improvements while neglecting modifications which are suitable and may be adopted to our field guns, the factors which limit our rate of fire are, first those peculiar to all systems, viz.:—

(*a*) The preparation of the fuzes and supply of ammunition.
(*b*) The loading.
(*c*) The laying.
(*d*) The firing.
(*e*) The requirements of fire discipline.

Second, that which is eliminated in the case of quick firers, viz., the running up.

Now as to (*a*) there is no difference between the systems; as to (*b*) a more rapid breech mechanism would be suitable to all field guns; (*c*) relaying is necessary with all field guns, including quick firers, owing to the jump of the gun and the changes in the platform due to the action of wheels and trails upon a yielding substance, the earth; (*d*), our present system of tube and lanyard is slow, a better method should be devised as suggested by Major Elmslie[2]; such a system would be equally applicable to all field guns; (*e*), the requirements of fire discipline have been dealt with and are common to all guns.

It therefore appears that it is in respect of running up alone that the ordinary field gun is and must be inferior to the quick firing, for the claim of Major Elmslie[3] that quick ranging is possible with a quick firing battery cannot be admitted. Captain Barlow's remarks on this subject are to the point.[1]

---

[1] Page 314, No 7, Vol. XXV. R.A.I. 'Proceedings.'

[2] Page 289, No. 7, Vol. XXV. R.A.I. 'Proceedings.'

[3] Page 292, No. 7, Vol. XXV. R.A.I. 'Proceedings.'

The question of what rate of fire can be obtained from improved field guns and what superiority of fire would remain with quick firers by reason of the elimination of recoil is one as to which there will be much difference of opinion. Certain it is that nothing approaching the rate of fire claimed for single Q.F. guns will be obtained when fighting in battery with due regard to fire discipline, and most critics will probably agree in the soundness of Captain Barlow's conclusion[2] that three rounds per gun per minute is the maximum rate obtainable by quick firers using "battery fire."

There would appear to be no reason why two rounds per gun per minute should not be fired from ordinary field guns were they modified as regards sighting and firing as suggested before. The difference, one round per gun per minute, is probably a fairly accurate estimate of the delay in the service of a gun due to recoil and the subsequent necessary running up.

If these conclusions are correct and the rate of regular aimed fire attainable with a Q.F. equipment is to the field gun rate as three to two it is apparent that no great superiority can be claimed for the quick firer if calibre has to be sacrificed in order to lessen recoil, for smaller calibre means fewer bullets and a consequent loss of power as already defined. But if Major Elmslie's estimate of a fourfold increase of fire resulting from the introduction of a Q.F. equipment is more accurate the question assumes a different aspect. This can only be settled by a thorough and prolonged trial of a quick firing field battery at Okehampton, which trial it is hoped will soon be carried out.

The conclusion therefore arrived at is, that if a satisfactory quick firer can be produced without loss of mobility and throwing shell little if at all inferior in weight to those of our present field guns, this weapon will be welcomed by our field artillery; such guns must be strong and simple and they must be thoroughly tried, not singly but in battery, under service conditions, before reliable conclusions can be arrived at regarding their efficiency.

Meanwhile, and in view of the re-arming of certain foreign armies, it behoves us to do our utmost to develop the full power of our present field guns.

The three requisites for fire effect are—

1.—Good observation by the battery commander.
2.—Accurate laying.
3.—Rapidity of fire.

In all these we are capable of improvement.

1. Observation is at all times very faulty. It is submitted that no captain of artillery should be promoted to major until he has passed a strict practical examination in the observation of fire, or that if through defective eyesight or temperament a man cannot be relied

---

[1] Pages 342 and 343, No. 7, Vol. XXV. "R.A.I. Proceedings."

[2] Page 343, No. 7, Vol. XXV. "R.A.I. Proceedings."

upon and it is desired to promote him, he should be compelled to make use of a competent trained observer.

2. The greatest pains are taken in every battery to train layers and constant practice in this duty goes on throughout the year, but skilled layers are passing to the reserve at 7 years and no effort is made to retain them in the ranks. Such men if called up would be of little use as layers—they would be completely out of practice and guns or sights or probably both would have changed. Young layers are easily flurried and lose their heads; the older men are invaluable. An extra 6d. a day to really good layers who extend their service to twelve years with the colours would be money well spent.

3. Lastly—Improvements of our present armament not involving structural alterations should be carried out and the rate of fire increased. Tangent sights should be constructed which can be left in the guns during firing; and the tube and lanyard should be replaced by a more modern arrangement.

It would also be well to consider whether the time has not come to modify, for the sake of rapidity, our system of "battery fire," and to recognise "section fire" where each gun is fired, not independently, but by order of the section commander, either at a stated interval or when ready. Objection is made to the proposal that control of fire would pass out of the hands of the major, that the service of the guns would be hurried, and the result not commensurate with the expenditure of ammunition. These objections do not appear to be well founded—the major (if the shooting appeared wild or hurried) could always return to "subdivision fire" or "battery fire" were it thought desirable to retain so many names; or he could order "section fire" at thirty or even sixty seconds, if he wished the fire to be deliberate. At present any delay in the service of one gun is carried through the whole battery, for though it is permissible to order the next in rotation to fire, a delay usually occurs before this is done. That this statement is correct can easily be proved at practice where it can be observed that individual guns are frequently ready to fire again 40″ or less after being discharged, yet a rate for the battery of six rounds per minute, representing an interval of 60″ between the several discharges of each gun, is seldom attained.

Were we engaged in war with a European enemy we should at critical stages of an action certainly attempt a quicker rate of fire than the "battery fire at 10″" which is now our limit. It is better to recognise this necessity and to prepare for it in peace, with or without the so-called quick firers, than to wait until compelled to improvise a different system of fire discipline on the field of battle.

Major-General J. B. Richardson: It appears to me that there is no question whatever of the enormous advantages of a quick firing gun in the field provided it is so formed that it is also a quick hitter. No man who has once handled quick firing guns can go back comfortably to the old fashioned thing. I happen to come fresh from work with quick firing garrison guns. Gunners who have once handled them do not like going back to slow hitting work.

None of the essays appear to me sufficiently go ahead. All seem to look for a Field, Q.F. which shall be a combination of a 12-pr. B.L. shrapnel gun and a Garrison 12-pr. Q.F. shell gun. There must be an entirely new departure. A great deal may be learnt from the experience of much shooting with Maxims of what will be required in your future field guns. I am not advocating small bore like the present Maxim. The effect of small blind projectiles cannot be seen except at very short ranges; at 1,200 yards one generally ceases to be able to tell where little bullets are striking. Still I think you can learn from the Maxim the nature of the future fire for Field Artillery, —a stream of bursting projectiles.

The practical rate of fire of a garrison quick firing gun has been enormously over-estimated by the essayists, and it will not do for you. This over-estimation of speed is caused by reference to shooting at a target that is quite close to the gun. It is easy to fire at even a fast target running 600 or 800 yards from you; you lose no time in seeing the shell strike, but a well placed 12-pr. quick firing garrison gun makes splendid practice up to 5,000 yards range, and firing at that distance it takes a time for the shell to arrive. Then the brain will not work instantaneously, you must add the time lost in making corrections. The stream of fire is not continuous. As long as you stick to shrapnel, which all the essayists seem to think must be the projectile for future work, you impose the greatest difficulties in the way of attaining really effective quick firing guns in the field. The essayists do not conceive anything beyond a quicker loading 12-pr. and existing methods of fire discipline.

Make up your minds to abandon shrapnel. It seems rather a large order, but let the English artillery once more lead, as they did when an artillery officer invented the shrapnel which has served so well, instead of following other nations afar off. The problem, as I see it, is really this: "How small a calibre of shell can be used, so that its striking effect can be fairly seen at the greatest ranges at which you are likely to use it? Supposing you take 5,000 yards, you must have a just sufficiently large projectile to see plainly a rain of bursting shell at that distance. Ranging with quick firing guns is the easiest and deadliest thing possible. I think I have seen battery majors who would be glad to do away with all trouble in the matter of ranging for length of fuze. The smaller the projectile you can bring yourselves to accept the easier the question of quick firing guns in the field will become. Instead of trusting to chance (for owing to many causes shrapnel fire with the most skilled major *is* chance) I offer almost a certainty of immediate effect. You have been working for years with the present gun, and yet the last speaker tells us there is plenty of room for improvement. This is very discouraging; I urge you to throw over a system which has wasted so much energy and cleverness and jump at a simpler and easier system which has less chance in its operation. I am quite certain that a rain of high explosive shells from a very quick firing gun which trusted to speed and accuracy for its effect is preferable to a shrapnel slowly bursting in the air, which, even on the experimental ground, is a somewhat uncertain job; and necessitates an alteration of fuzes, which after years of struggling you can never manage always to do quite right. Give up the fuze question, cease to think that the number of balls in the shrapnel is a vital matter, and you will sweep every difficulty out of the way of Field Artillery. It will be found that batteries throwing heavy shells will be found necessary to supplement the high velocity rapid hitting guns I have indicated. We shall still have to use some sort of high angle, common shell, because there is no doubt that a high velocity rapid firing gun would not search out hollows or destroy earth works effectively.

There has been much talk about spades on the trail. Any attempt to stop the recoil by the trail alone is faulty from the first. Do away with the spade in the trail and you can get the good traversing powers which you need for the field. There is one other thing which I do not think any of the essays mention and that is that you can always seat the numbers on a Q.F. gun and so gain weight to stop the recoil a great deal. With equipment such as I seem to see in my mind it would not require more than half the number of guns you now have in the field to produce a greater effect in a very much shorter time.

The difficulty of ammunition supply will be much the same as at present because in reasonably skilful hands no greater weight of ammunition is used for a given task than is required for the same job when working by slow methods. There is however another point which has to be considered. Only the other day I fired some thousands of rounds rapidly out of a Maxim, and the difficulty then is the heating of the gun. I believe it may be got over. The new artillery will, at first at any rate, have to use lighter projectiles than the present 12 or 15-pr. high explosive shell with a tolerably thick wall, breaking by lines of least resistance into fairly large pieces with a head of a shape to cause ricochet.

This will revolutionize many of our existing arrangements for Field Artillery work. There is no reason why the gun itself should not be somewhat on the lines of the Maxim. The existing Maxim, deadly as it is, will not do at all owing to the difficulty of seeing effect especially at night, but where I should like to see an experiment is in the line of gradually enlarging the Maxim until a perfect view of the effect is seen up to 5,000.

Lieutenant C. Holmes Wilson, R.A.:—In view of the large amount of information which the essays already contain, it would perhaps be well if we could limit the discussion of their contents to the more important points to be considered by avoiding the repetition of unnecessary detail and alluding solely to the principal features of the problem. It has been generally acknowledged that the adoption of quick firing guns has become, not a question of choice, but a matter of absolute necessity. On the Continent a large proportion of the field artillery have already been re-armed, France has been forced to follow the lead of Germany and now we must certainly appear bound to follow the example of both. Yet whilst abundant proofs of the policy of our neighbours have been constantly forthcoming, the indications of our own activity have been limited to a few unimportant statements in the House of Commons. Feelings of anxiety as to the state of our preparation have thus undoubtedly been aroused, and it would be well if such misgivings could be allayed if not removed. In fact what is urgently required and what it would be well to emphasise to-day, is the necessity for immediately arriving at some decision as to the nature of equipment to be adopted. Although the superiority of the quick firer over any other weapon that can be produced has been generally acknowledged, comparisons between it and its possible rival, the heavy shell, have been brought forward if not commended. A heavy shell has undoubtedly its characteristics and special advantages, but its capabilities for decisive action can scarcely be compared to those of the Q.F., whilst against a moving target it has no features of special importance to commend it. Comparisons are however somewhat unnecessary, as they are presumably based upon the assumption that the projectile of a quick firing weapon must be a light one, which is a supposition which is neither supported by the opinions of manufacturers nor by the practical experience of experimental tests, so that consequently as no loss of shell power need necessarily be entailed by the introduction of a Q.F. gun no similes need be indulged in. The next point of importance which appears to commend itself to our attention is the possibility of effecting a reduction in the number of guns attached to an army corps. With quick firing artillery it will of course be possible at times to obtain a much greater intensity of fire from a similar number of pieces than has ever hitherto been the case, consequently for nations who possess more guns than they will perhaps ever find space to employ, the question of a decrease of strength becomes possible if not practicable; but for a nation like ourselves who have few batteries and fewer horses, it seems a somewhat unnecessary point to discuss. Four gun batteries may prove to be better than six, they would probably be easier to handle and more suited to the requirements of the ordinary artillery position, but when the majority of our batteries already in reality consist of little more than four guns and when we have no practical experiences to guide us, is it not unwise to make such suggestions! As regards the expenditure of ammunition, a variety of opinions appear to exist, the extremes have been fully represented and we glide with comparative ease from a heavy and incessant storm of shell to a mild and intermittent shower of shrapnel. The constant employment of a rapid rate of fire appears to be neither possible nor desirable and the probability of its use at any except short or medium ranges seems hardly to be worth considering. Consequently the use of a rapid fire will probably not only be limited to critical and decisive moments but also to comparatively short distances at which observation can be carried out with some prospect of success. The expenditure of ammunition will thus be restricted, and —what is often forgotten—a limit will be imposed upon the extent to which even the most economical of governments can reduce their artillery, as when they cannot fire rapidly quick firers will possess no more power than our present weapons. Some doubt still appears to exist in regard to the rate at which fuzes can be set, to remove the fears of those who may anticipate difficulties in connection with the setting of fuzes, I have carried out some practical experiments with our present 15-pr. armament. With two selected men setting fuzes at the limber or wagon and another man transporting the ammunition to the gun, twelve shell were prepared in fifty-nine seconds; with unselected men a similar number of rounds were provided in seventy seconds. It is also evident from this that a man will only be saved from the detachment to be utilized at the wagon in supplying ammunition. The possibilities of rapid ranging have been alluded to, but no reference has unfortunately been made as to the system to be adopted. Some more rapid system should certainly be possible, but the whole operation depends so much upon the capabilities of the commanding officer for observation, that it is difficult at present to see how the pace can be increased unless more opportunities for preliminary training can be provided. Observation is the most important feature of every series fired, without it, effect cannot be secured, yet it is to observation that the majority of failures at practice are due, and it is in this most important portion of the whole system that no practical preliminary training is ever thought of or attempted. Under existing conditions, if rapid ranging is to be attempted, a "quick seeing C.O." will have to be introduced at the same time as a quick firing gun, for it is impossible to suppose that, if carried out as at present, observation will in the future be remarkable for anything but the uncertainty of its results. Some practical form of preliminary training should be possible and would undoubtedly lead to more success than can at present be even expected. By the introduction of such a method the only variable feature of our present system would be removed, the way paved for a general acceleration of drill and the cause of much of the usual annual disappointment and discouragement removed.

What we have now to do is to decide the nature of gun to be adopted, what we have then to do is to see that the work of re-armament is commenced. Our hands have been forced and we are already considerably behind our possible rivals, the time for discussion has passed and the moment for action arrived; indeed if the facts before us are authentic, if the theories deduced are correct, we cannot but infer that the situation is an extremely grave one.

Colonel Sir G. S. Clarke, K.C.M.G., R.E.:—General Maurice, ladies and gentlemen, I think that the Royal Artillery Institution is decidedly to be congratulated upon these essays, which seem to me both thoughtful and go-ahead. If there are any persons who think that the British Army is a fossilized body I suggest that they should take an early opportunity of reading all these essays. We may take it I think that the consensus of opinion of the essayists is that some sort of quick firing gun is necessary and inevitable. I entirely agree and have held that opinion for many years. Eight years ago I had the privilege to be associated with Colonel Walford, one of the most experienced artilleryman in this or in any other country, in seeing some extensive trials of quick firing guns at Magdeburg. We divided the report between us—he dealing with guns and I with carriages. His deduction from what we saw was that it practically tended to show that quick firing guns are an advantage only when fired from fixed mountings. That was the one point in which I could not agree with him, and I recorded my dissent in the report.

At the present moment what we have to consider is:—

1. What can reasonably be expected of a quick firing equipment, and

2. How far the requirements can be fulfilled without in any degree injuring the mobility or other quality which the artillery now possess. With regard to the first point, there are two extremely important considerations. There is no doubt whatever that it will increase the speed of fire and I think it is perfectly clear that we cannot pit one artillery with a given rate of fire against another with a double rate obtained with less fatigue to the gun detachments. The saving of fatigue to the detachment using a quick firing equipment is to my mind one of the most important points, and this can undoubtedly be effected.

As regards shrapnel, I think that the Royal Artillery were ahead of the rest of Europe in first perceiving that shrapnel was the projectile par excellence for field artillery—I think they have studied it more than any other artillery, and I think they are quite as well, if not better, able to use it than any other artillery force in Europe. I was fortunate enough to go over the field of Slivnitza with Colonel O'Callaghan, R.A., shortly after the battle. We there saw the ground where two Bulgarian guns firing shrapnel with time fuzes were said to have put out of action two Servian field batteries, using common shell with percussion fuze. We could not verify the fact but we examined the ground, and there was certainly evidence that the Servian batteries had been severely mauled, while some scoops in the ground near the position occupied by the Bulgarian guns and the skeleton of a horse, stated to be the only casualty, were the only signs of fire effect on the other side.

I do not think any of the essayists allude to the rather curious fact that the first power to use quick firing guns in the field was Abyssinia, which used three-pounder Hotchkiss guns against the Italians. I am informed by a friend who went over the battle field with Abyssinian guides that, at the battle of Adowa, the Italian mountain guns could not live under the rapid fire of small shells that the Abyssinians delivered. The Hotchkiss guns like those employed in South Africa, used fixed ammunition; but I agree with Captain Barlow that fixed ammunition is unnecessary and undesirable—I believe that, using bare charges, we can get four aimed rounds per minute out of field guns and possibly five.

Waste of ammunition seems to me capable of being erected into a bugbear. I think high rates of fire will be necessary only for short decisive periods and that there will be no necessity to quicken the fire under ordinary circumstances. Then there is the matter of fire discipline. With a highly disciplined force I think this can be guaranteed. It is much easier to control the fire of a battery of artillery than that of infantry when they are in scattered order. The objection that ammunition may be possibly wasted is capable of being made too much of.

Then the second point is how the requirements are to be met. There are two important limiting conditions upon the manufacturer. In the first place he must do nothing which will decrease in any way the mobility of artillery. I think that we are all agreed that a battery of horse artillery should not have their present form of movement limited in the slightest degree, that is a severe condition which is imposed upon us manufacturers. The second limiting condition is the necessity of what is known as simplicity—I think the meaning of simplicity is not always understood. It is not a simple thing to define simplicity. As Major Elmslie has pointed out in his essays the things that seem complicated at first, when we are accustomed to them become quite simple, and we may sometimes mistake unfamiliarity for complexity. The most complicated thing may be the simplest in actual working. The 6-in. quick firing gun of to-day, which is practically the staple armament of most navies, is a complicated thing, but it is much simpler in handling than the 32-pounder with which we won our great naval victories. The Lee-Metford, or the 3-lb. Hotchkiss—is not in itself a simple machine, yet we have seen that the Afridis can use the one and the Abyssinians the other. Provided that the machine will stand the rough usage of the field, we need not be afraid of what is sometimes called complication. This is the real test. We cannot of course hope ever to make a field carriage recoilless. That is out of the question, the ground is always varying, and the anchorage which answers in one case will not do for another; but we can go fairly near to the conditions necessary for increasing the speed of fire of field artillery.

There are four solutions of the quick firing gun carriage problem. The first is to make the gun and carriage recoil over the spade and run them forward into position by means of a spring. That is the principle of the patent that Messrs. Vickers are working, which has been tried for many years, and probably is as perfect now as it ever will be. It has a great many advantages, but it has a drawback to my mind that is that it has a recoil of perhaps thirty inches so that the men must always stand clear of the wheel before every round. The second plan is to hold the carriage by a spade under the point of the trail or under the axle and to give the gun in the carriage a long recoil. I have applied this arrangement by converting an existing carriage which behaves very well and only recoils three or four inches, but the jump is at present too great. However, with a $\frac{3}{4}$-charge the converted carriages leave little to be desired. I think that the jump can be got over by a careful adjustment of the buffers, but the question largely depends upon the internal ballistics of the gun. The third method is to treat the guns and limber as one mass. I have designed and made a carriage on that principle which I think is very promising and perhaps the best of all; but this first carriage is not as perfect as it should be and as it could be made with the experience I have now obtained. You can keep down the recoil of the whole mass to about three inches on fair ground. Then you have traversing gear, giving at least 10° on each side of the centre line, to meet the difficulty to which Colonel Richardson alluded and you can use a shoulder piece in training. The drawback is that if you have to shift to a target lying outside the extreme training of the gun, you have to move a four-wheeled vehicle instead of a two-wheeled vehicle. I believe that if you would be satisfied with the 1,400 feet velocity which Major Elmslie recommends, it is possible to make a carriage on this principle which will do all that is required without exceeding the limits of the present load behind the team. The fourth plan is to put the gun and 40 rounds of ammunition on a single pair of wheels and make a long trail used as a pole. I designed a carriage on that principle but it looked rather strange and I am afraid it rather shocked the sense of propriety of the Ordnance Committee when they looked at it. But I should like to say although I thought the idea was original Major Abdy a short time ago brought me a beautiful picture painted by the first Captain Congreve about 120 years ago in which he showed the whole thing painted in his own hand. So that the idea is an old one after all and this is only another instance of how shamelessly our predecessors have stolen our best ideas.

There is one other matter affecting the speed of fire and that is fuzing, I venture to think that the present method of fuzing can be much improved.

If you have to set ten fuzes say to the same length, an adjustment has to be separately made to each. It seems to me possible to make a tool which being itself set will automatically set the fuze. I throw out that idea because I am sure it can be done.

In conclusion I should like to say that, if you do not hear very much about the Carriage Department and you hear a great deal about the triumphs of other manufacturers at home and abroad, I would ask you to believe that, although we have many difficulties to contend against, we are not by any means behind the time.

Lieutenant A. T. Dawson, R.N.:—General Maurice, ladies and gentlemen, I thank you very much for permitting me to take part in this discussion. I feel a great deal of reluctance in speaking on a purely military subject, but perhaps as a manufacturer, you will listen to the few remarks I have to make, although, after what Sir George Clarke has said, they may fall rather flat.

I have read the essays with very great interest, as also have several members of the firm to which I belong, and we are all very pleased to see that there is a general consensus of opinion that the advantages of the quick firing gun for the field are very much in advance of the disadvantages. I need not say that this has been already recognised by many foreign countries, notably Germany and France. Italy also has carried out trials, and Spain has done the same. The Russians are carrying out trials almost immediately—in fact, they have already carried out some.

I only wish to deal with that portion relating to manufacture, and not in any way to trench upon the military side of the question.

Speaking therefore as a manufacturer, the all important factor of the quick firing gun, as applied to the field, is that you should be able to obtain a really quick rate of fire, without the sights being thrown out of the alignment, and yet be able to alter the training within a moderate arc of fire without unduly fatiguing the detachment.

Now many systems have been devised, which Sir George Clarke has already alluded to, and I may tell you that already one firm in France, viz., Compagnie des Hauts Fourneaux et acieries de la marine et des chemins de fer de St. Chamond, have designed a carriage, the patents of which my firm control, and therefore I must not lay too much stress upon it, giving, I believe, the greatest rates of fire ever obtained at present in Europe. At the same time I should like to deal with that particular mounting more than any other, because I am more familiar with that system, although I have read of, and have had on the best authority a good many descriptions of other types of mountings at present in use in Europe, but I know my own best. We have obtained with this mounting a rate of fire of fourteen aimed rounds per minute, the fuzes having previously been set for the range, when using shrapnel, or when using case shot. But perhaps a more practical illustration of actual rapidity of fire was obtained from the gun under the following conditions. The gun was trained five degrees off the target and not loaded, being in such a position as you would reasonably expect when coming into action. Time was taken under these conditions, and the fuzes were set deliberately before each round, the setting being checked by an independent number and every round was carefully aimed on a target. Ten rounds under these conditions were easily fired with the usual gun detachment in one minute.

Of course the question of the supply of the ammunition and the setting of the fuzes is very important, but I think you will agree with me that it is of the first importance to have a mounting from which you can get a very rapid rate of fire, and facilities for overcoming other difficulties will very soon follow.

I may say that the Compagnie des Hauts Fourneaux et acieries de la marine et des chemins de fer have even gone further than we have in regard to the rate of fire; they have obtained a rate of twenty-five rounds per minute from this mounting. This rate of fire appears almost exorbitant, but they have obtained this extraordinary rate of fire, this very great speed, by the addition of a very few parts to the equipment, in fact the increase of weight is something like only 70 lbs. I do not put that forward as a proof that other people should obtain the same rate of fire, but it is interesting to know that they have done so, and I am persuaded that they can obtain a rate of even thirty rounds per minute from their system, with certain other small modifications.

Sir George Clarke alluded to the system of the gun and carriage recoiling over the spade and being run forward into position by means of a spring. The great advantage of that system I think is that the actual strains on the mounting are very low; a large mass recoils through a somewhat long distance and therefore you are able to make the structural parts of the mountings perhaps lighter than would be the case with other systems. However, we do not actually do this in practice, we make it lighter by the use of stronger material, and are by that means able to take the strain without any possible risk. Another very important advantage of this system of overcoming recoil through a long distance and keeping the strains low is that there is less liability to jump and so throw the sights out of alignment.

Associated with the system of recoiling the whole mass over the brake arrangement, there is another advantage which is perhaps accidental to the system, but nevertheless of some importance, and that is that the brake can be readily detached in case it should be damaged by shell fire, or it should be desired to lighten the weight behind the horses in travelling over rough country. This brake complete weighs two hundred pounds and can be detached without skilled labour in under a minute, and when so removed, you have to all intents and purposes an ordinary field gun, without any of the complications whatever attendant on the quick firing system. That, I think, might be considered an advantage, although I do not anticipate in that particular system of mounting that there is any fear of anything going wrong with the cylinder because it is right under the trail, and is well protected from fire, and even if it were hit, the material of which the casing is made is so strong that nothing but shrapnel or high explosive shell fire would do it any damage.

Now Sir George Clarke alluded to what he considered to be the best principle, namely the joining of the limber to the gun. I can only say in regard to that, that if you have to turn your mounting through 90 degrees very rapidly, it will have a very great disadvantage, and with Horse Artillery rapid change of direction is likely to be required. Perhaps with Field Artillery this condition is not so essential, but I think you will admit that the quick firing systems employed should be the same for one as for the other, provided you do not lose very much by it.

Speaking generally, there is no doubt that the rate of fire of fourteen rounds a minute can be obtained with a trained crew, and a modern Q.F. field carriage.

I have heard it mentioned that setting fuzes may cause a reduction in the rate of fire, now I can practically attest that fuzes now being used in Europe, and notably one supplied by Messrs. Krupp, of Essen, can be set in about three seconds.

In regard to the best form of ammunition to obtain a maximum rate of fire, I am persuaded that it is necessary to attach the charge to the base of the shot and ram both home together by hand, in the same way as you load fixed ammunition in a metallic cartridge case, and so you would obtain the full advantage of your quick firing system.

It would I think be even more satisfactory to carry the shell fuzed, with the cartridge attached, each round being in a separate compartment capable of holding (say) three rounds, which could be quickly moved to the firing point. A rapid rate of fire will be of great advantage also in the question of ascertaining the range. The force that is able to ascertain the range quickest will certainly have a great advantage, more especially if both forces are armed with quick firing guns, as the battery which is slow in ascertaining the range will be greatly handicapped in ascertaining it by the heavy shrapnel fire of the more expert opponents.

THE CHAIRMAN :—You did not mention the weight of the projectile when you obtained 14 rounds per minute.

LIEUTENANT DAWSON :—In one case the weight of the projectile was 13¾ lbs. and in another 12½ lbs., but the same rate of fire could be obtained with a 15 lb. shot. I do not think the weight of the shot would in any way influence the rate of fire. In regard to other systems, such as Sir George Clarke alluded to, namely, a fixed spade running into the ground, we know that when the gun is fired the strain on the mounting is very great.

With regard to the systems as used abroad, I had better not specify any particular one, but systems as used by foreign countries have been made with spades directly attached to the trail, and sometimes with the intervention of the spring between the spade and the trail, and I may say that I know for certain that these systems have failed when they have had experience of active service, and that being so I do not think it is a principle that should be advanced too seriously.

Then, in regard to taking the recoil through the recoil buffers on the carriages, and by a spade at the end of the trail, we know that if these recoil buffers are put up in a most prominent position on the carriage, they will be shot at and put out of action, and then your whole gun is out of action; that therefore would be a serious objection.

I omitted to remark in regard to a system taking the recoil through a long distance, we are able to obtain very much higher ballistics, if such are required by the military authorities.

We have made guns weighing 5¼ cwts., and we can obtain on this particular mounting the same rate of fire, as I previously alluded to, and get a velocity of 1,700 feet, but I think you will agree that that is rather a high velocity for a field gun.

I do not think I should say any more this afternoon as I know the time is short, but I thank you very much for listening to me in the way you have.

REAR-ADMIRAL LORD CHARLES BERESFORD, C.B., R.N., M.P. :—General Maurice, ladies and gentlemen, I think perhaps I ought to apologise as a seaman amongst this distinguished company of Royal Artillery officers and others for entering into the debate at all, but after all I am certain that you recognise that we resemble each other; we are sea gunners, you are shore gunners; we have to work artillery both heavy and light and have to land our batteries on shore very often for active service. As I read these essays the pith of them appears to me to be that the quick firing gun must be taken as better than the slow firing gun with its present mounting. The arguments of the distinguished officers who have written these essays are well borne out by actual facts. We have, in our ships, so far as we can, tried to make all our guns quick firing. Some mercantile firms have made a quick firing 8-inch gun, but we have preferred afloat a quick firing 6-inch gun, and quick firers of 4·7-inch, of 12-pr., of 6-pr., and down to 3-pr., and what I want to point out is that we have actually altered our 30 calibre 6-inch gun that was not a quick firing gun, and made it into a quick firing gun now because we are so certain that the quick firing gun is better than a gun that is not quick firing.

There is another point that was brought out by one of the officers who spoke just now, and that is, that the French and Germans and all foreign powers (who, remember, are the great military powers of the Continent) have determined that the quick firing gun is the best for Field and Horse Artillery, and I am informed that both the French and the Germans have at this moment 150 batteries each fully equipped and ready to take the field with quick firing guns, and that as soon as they can get the money they intend to alter the whole of their artillery complement to quick firing guns. I think that is a very startling fact and a fact that our government ought to recognise and probably will recognise after a meeting of this character. I have in the House of Commons twice spoken on this question of the necessity of fitting our Horse and Field Artillery with quick firing guns, and I have got up till now rather evasive answers; but after this meeting I shall take the liberty of asking some more or less impertinent questions on that point again.

There is another point upon the quick firing guns. I have found out what happened on the 5th of April at Atbara. There is no question that the cavalry reconnaisance of 800 men would have been annihilated except for one battery of Maxim guns. I have seen three officers who were there, and in making these remarks I do not want to say anything invidious of the Sirdar or of those officers who fought there; I give them every credit. They sent those Maxims there because they knew that if they did not, with the small force they had and 4,000 cavalry of the enemy in close proximity to where the infantry were in the Zareba they could only hold their own with the Maxims. What happened was this. The cavalry absolutely surrounded our small force; the infantry came out of the Zareba and things did not look very bright; but whenever the cavalry formed up to charge they were only up to 1,200 yards when the Maxims played upon them and they never could get a force large enough to come down and charge our small force of cavalry. There is no doubt in the world that that was owing to the Maxims being able to fire very quickly and that they are worked on the quick firing principle. I may mention also that the Egyptian Government as it is called (that really means Lord Cromer) have, I think, two batteries of quick firing guns at this moment,—I know they have one. Therefore they recognise that it is a very useful armament.

There were one or two remarks made as to training the men. If you get a new armament, which the quick firing gun will be to a certain extent, the most careful organization and training will be necessary for the men to use it effectively, and I quite agree with the officer who said that what he called the layer, what we call No. 1, the captain of the gun, should certainly get extra pay because he is the most important man at the gun. It is no use your bringing twenty batteries into action unless your No. 1 or layer can put the shot where whoever is in command wants it. Therefore you ought to encourage your men to be good shots by constant practice and also the captain of the gun ought to have additional pay. It is possible also that you may have to reduce the weight of the shot, but any man who has been in action knows that it is much better to lay on to the enemy with a great number of small shots than with a few large ones.

There was another point which was mentioned which is the supply of ammunition. Now the supply of ammunition used to be an old bogey as many officers in this room know. I myself remember, and so does a gallant Admiral I see here, the old muzzle loading rifle and muzzle loading gun. When the breech loader was introduced this was the great bogey: "Oh, don't you have the breech loader, you will never be able to control the men, and they will waste the ammunition, and you will never be able to take enough ammunition into the field with breech loader guns or rifles." I should call that a bogey. Do let us have the best arm. We have no right to see foreign countries, the great military powers particularly, arming their Horse and Field Artillery with quick firing guns unless we do the same, and I maintain that the officers who have written these essays have done a great national good. They have everything on their side; they have done what we have done in the navy and what the great military powers are doing at this moment to get quick firing guns, and we ought to do the same. I do not know whether there are any members of Parliament present,—I think I see one and he is a man who takes great interest in military matters (Mr. Arnold-Forster), I know I shall have his support in the House of Commons in raising this question again.

Colonel Lonsdale A. Hale:—Since artillery does not fire only on artillery on a battle field, the question of the adoption of Q.F. guns concerns the other arms as much as it does the gunners. If any one nation chooses to adopt this diabolical weapon, which by a storm of shot and shell can bring at certain moments an annihilating fire on its enemy, other nations must adopt it also, for no army can escape demoralization if opposed to another provided with a specially destructive weapon which it does not itself possess. It would be well if the artillery would bear in mind the old proverb "the better is the enemy of the good," and would quickly provide the army with a fairly good Q.F. gun rather than expend time in searching after a better one, for the day is past when is was a debateable question whether or not the army should have such a gun; the Q.F. gun it must have, and quickly too.

The Chairman:—I have to apologise to you for taking the chair this afternoon as a *pis aller*. The Duke of Connaught was unexpectedly summoned to Windsor, and try how we would we have not been able at such short notice to obtain anybody whom we wished particularly to take the chair. We tried in every possible direction. We tried to get the Commander-in-Chief; we tried to get Lord Roberts; we have tried all round; and I am simply taking the chair because we have been utterly defeated and we can get nobody else.

I think our discussion to-day has been an exceedingly valuable supplement to the essays which have been given in. I had made a note beforehand on certain points which it seemed to me had not been adequately touched upon in the essays, not through the fault of the essayists but because of the circumstances under which the essays were written; that is to say that they happened unfortunately to be composed just before there had been any war trials of the quick firing gun and before any good quick firer could be seen by them. Those difficulties have in some measure been realised. Lord Charles Beresford suggested just now that two of the batteries that were employed at the Atbara were quick firing batteries, at least they called them so. Of course the definition of a quick firing gun is rather a dubious matter at this moment, but out of the three batteries that were present two were called quick firing batteries.[1] And similarly at Santiago certainly the Spaniards, and I think the Americans, have been using some quick firing guns; I suppose because sailors have been always ahead of us as gunners in all those matters and a good many Spaniards were landed from the fleet. I think they landed some field service guns from the fleet.[2]

Then I would venture to say humbly to Colonel Hale that when he says "It is not you gunners only who are interested in this question," and denounces us for imagining that we are, he is a little hard on us when we have been hunting the world round to get somebody who is not a gunner to preside at this Institution this afternoon,—somebody who was like the Duke of Connaught, a representative of the army at large. Unfortunately for us, being not only a soldier but having besides his soldiering duties, national duties to fulfil, he was not able to attend. I am only very sorry that we have not been able to get anyone who would more effectually than I represent the army at large.

I intend to take the discussion backwards because it so happens that we opened out into that larger field which Colonel Hale rightly suggested as the important one towards the end of the discussion. Lord Charles Beresford says that we ought to look upon the Navy "at least as sea gunners"; I scarcely know of a case when we have had to get any new invention when we have not had to look at the Admiralty to introduce it for us; that was the case with the Maxim and many other things. I do not say it with any disparagement of Sir Edwin Markham's department because it is fortunate for him that you sailors stand in front of him to blow away those financial difficulties which always obstruct the department or the Government, and I do not believe Sir Edwin Markham's own department has a better friend than the sailors who perform that function for him. You cannot fire away too hard for us.

---

[1] They were in fact mountain guns of a quick firing pattern supplied by Messrs. Vickers & Company. I have seen a similar gun and they proved so successful at the Atbara that more batteries of the same pattern have been ordered. Under favourable conditions the single gun has fired seven rounds a minute. Practically, however, we now mean by a "quick-firer" field-gun a gun that does not recoil, and in that sense these were not "quick-firers."

[2] I have had reason since the meeting to doubt whether any other than the 6″ ship-gun quick-firers were used.

I have already spoken of the fact that the Maxims in the reconnaisance to which Lord Charles Beresford alluded were not by any means the only quick firing guns that appeared in Egypt, but I wish we could have had more particulars about the two batteries at the Atbara. There have been several men in England who were at the battle of Atbara, and I was very much in hopes that we might have had some of them here this afternoon, but I do not think there is anybody here who can give us details of the action of the quick firing guns then. Similarly, I was hoping we might have caught somebody who had seen something of the American and Spanish business; but I am afraid nobody has come back from there who can help us about that.

The question of the recoil and the number of the detachment seemed to me not to have been adequately dealt with in the essays. Most of them assumed that it was impossible for field-guns, to get rid of recoil but practically, as Lieut. Dawson has shown, that has been done. I could not make out that any of the essayists adequately recognised the importance that it would be to us, apart from quickness, to have the recoil diminished, in reducing the labour at the gun and therefore the number of men exposed at the gun. In some of those experiments by Messrs. Vickers which were seen by a large number of officers the other day, under Lieutenant Dawson's guidance, only two men were required for the working of the gun. Now if we can reduce the numbers at the gun to two men that of itself will be an immense gain. In the first place because our great difficulty is to get a sufficient number of men for the artillery; secondly, because it will diminish the exposure of the gunners at the gun very much and thirdly, because we must have a large number of men behind and that would give us a continually fresh supply of men at the front which would keep up our power of firing to a much later date.

In passing back to the earlier part of the discussion I am rather inclined to fortify myself with the words of Lord Charles Beresford, of Sir George Clarke, and I may add also of Colonel Hale in saying that any discussion as to whether we are or are not to have a quick firing gun is quite a thing of the past. We must have it. That is the sense I think of the meeting generally, that we may discuss the method in which we shall use quick firing guns, but we cannot discuss whether we are to have them or not. Therefore I think those experiments which Lieutenant Wilson has been carrying out for us of the rapidity with which fuzes can be set by a little different arrangement and still more the suggestions which Sir George Clarke has thrown out of improvements in mechanism by which fuzes can be very rapidly set become of vital importance to us. There is one thing that becomes a necessity from the moment that we adopt quick-firers, that is a vast improvement in the whole arrangement of the supply, from the park right up to the front, of ammunition. I am inclined to believe that in the course of battle you will not expend many more rounds with the quick firing gun than with the present one because the rapidity of decision will be so much greater that you will merely in a given part of the battle expend rounds more rapidly; but still it will become absolutely necessary to keep the batteries, during the time they are engaged, thoroughly supplied with ammunition. We have only had two experiments, so far as I know, with both of which I happen to have been concerned in working the supply of ammunition in the field, one was at Aldershot where Colonel Davidson and Majors Gossett and Guinness came down to Aldershot in superintendence of the large ammunition columns then formed and the other was at Okehampton where with one particular battery, then of my own Brigade Division, we fired off nearly 1,000 rounds in the course of the day and worked up the ammunition from the park through the ammunition columns for it. Clearly, if the quick firing gun is to come in that will be an absolutely necessary part of our drill. It does seem to me the greatest possible misfortune that now when these huge manœuvres are coming off we should not be able from sheer deficiency of transport to practice adequately the working from the park, through the ammunition columns, to the front of a supply of ammunition. I wish we could do it on a limited scale if only with a single battery or brigade division. That all the mechanism must be adapted to the most rapid supply must be evident to everybody. The day before yesterday I was working with one of the present "Artillery and Store" waggons, and the labour (if I may venture to call the attention of the Ordnance Committee to the matter), of getting ammunition out of the huge boxes now used, taking out every separate shell in order to pack them separately into the ammunition waggon on its arrival is a thing that I am certain would entail a break down when we get a quick firing gun. You must have some system adopted in which a whole set of shells may be taken out into a tray and put straight into the ammunition column.

Sir George Clarke :—I may say that I have already built a limber to do that. It is divided into pigeon holes for boxes each of which forms a portable magazine containing four complete rounds. These boxes would be filled at the base and would go thence straight to the gun in action without any re-packing.

The Chairman :—I think that that is the most important improvement we could have, and when it is done I wish Sir George Clarke would come up with me and let us see it work right through if I may invite him now, because at the present moment it is dismal; it takes half an hour and I do not believe we should have half an hour to do it.

General Richardson said, what I cannot think there can be any doubt about, that we have to deal with an entirely new departure; that whether it is a question of getting a high explosive shell or of ranging or of change of drill it is no use starting with the present system of drill and fire discipline which is suited to our present gun in considering how we shall deal with the quick firing gun. When we have the quick firing gun we shall have to create our drill and adapt all the other things to it. We must have it, and we shall have to learn the fire discipline, ranging, fuzing, and the ammunition supply and everything else that will suit it.

I agree with many of the points raised by Major Jeffreys, but for our immediate purpose the important thing is that the meeting is practically unanimous that we must have quick firers and that as soon as possible. The Council of this Institution were so kind as to express their pleasure at the Artillery Institution coming here. Perhaps I may in the name of the Artillery Institution thank the Council very much for having allowed us to come this afternoon. I am sure there can be no doubt that these larger artillery questions like the larger cavalry question which was brought up here the other day are matters that concern all the arms of the service, and the more they are discussed in public with the criticism of all the other arms as to where the co-operation of the three arms can be brought together the better it will be for us all.

THE DEVELOPMENT OF ARMOUR DURING THE YEARS 1893-98.

BY

CAPTAIN C. ORDE BROWNE, *late* R.A.

Summary of progress during years 1893-1898.

THE principal changes in the character of the armour plates made by most nations during the years 1893-1898 are as follows:—

(1.) The use of plates of medium thickness and also of thin armour has been greatly extended, because as quick fire developed, it became increasingly important[1] to protect Q.F. pieces, and also because the quality of armour has been improved, so that thin plates furnish better protection than formerly, and thus give a better return for any sacrifice made to provide them.

(2). The employment of nickel has become more general; the toughness which it imparts has been more fully recognised and the difficulties connected with its use have been overcome. Sheffield makers now all employ nickel.

(3). A system of manufacturing armour combining a hard face with extraordinary toughness, devised by Herr Krupp, has been purchased by our Sheffield makers and some admirable results have been obtained by them with plates made by this process, modified and shaped accordingly to the habit and experience of each establishment. This toughness has been exhibited where it is especially valuable, namely, in thick armour.

Following the above changes in manufacture, the tests for armour supplied to the service have been made more severe especially in this country. Thick and thin armour being alike tested on supply. Projectiles have been improved and caps for the protection of the shot's point in penetrating hard faced armour have been tried and found effectual in England, Russia and America. Armour piercing shells and common shells have been made and tested more than formerly.

1893 Harveyed armour trials.

To trace the progress in detail. Early in 1893 Harveyed armour had finally established its character in British trials on board the *Nettle*, Vickers 6-inch steel Harveyed plate being considered to offer the same resistance to a shot striking it at 1,800 f.s. velocity, as a Brown compound Tresidder plate opposed to a similar shot striking at 1,600 f.s., while a Vickers untreated steel plate was perforated comparatively easily.

---

[1] This will be found more fully discussed under changes in ship structure.

In 1893, several trials of thick plates of Harveyed armour proved that the process was capable of imparting to thick armour a considerable measure of, though not the full advantage given by it to thinner plates. In this year also, the great toughness imparted by nickel was illustrated in American plate trials.

1893 Harveyed 14-in. plate attacked by 10-in. shot.

Fig. 1 shows the sketch of a Harveyed nickel steel plate, 9 ft. × 7 ft. × 14 in. after attack by 10 in. Holtzer projectiles, each weighing 500 lbs. The striking velocities, energies and calculated perforations are shown in the following table, Tresidder's formula being used for velocities over 1,580 f.s., that is for the last three rounds:—

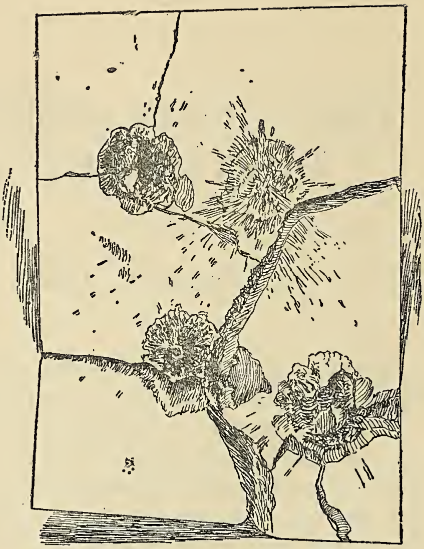


Fig. 1.

Round.	Striking velocity feet seconds.	Total energy, foot, tons.	Energy, per ton of plate, foot, tons.	Calculated Perforation, inches, iron.	steel.
No. 1	1472	7513	469·6	15·8	12·7
" 2	1859	11,990	749·4	21·5	17·2
" 3	1959	13,300	831·3	23·1	18.5
" 4	2059	14,700	918·8	25·0	20·0

The importance of this trial consists in the fact that the plate was much thicker than those previously tried. It was broken up but not perforated and no bolts were severed. The projectiles in every case broke up, the maximum perforation of the embedded head being estimated at 11 inches.

1893 Carnegie 9-in. plate for *Monadnock*

On July 11th, at Indianhead, two nickel steel plates with unhardened faces shown below, were tested[1], which exhibited the toughness characteristic of such unhardened nickel plates. Fig. 2 shows a Carnegie plate for the side armour of the *Monadnock*, 9 ft. 7 in. × 6 ft. 3¾ in. × 9 in. and weighing about 10 tons. It was attacked by three 8-in. forged Holtzer shot, each weighing 250 lbs., with 1,400, 1,683 and 1,543 f.s. velocity successively. The second shot with a calculated perforation of 14·7 of iron or 11·8-in. of steel, perforated the

---

[1] Witnessed by the writer and described in the *Engineer* of July 28th, 1893.

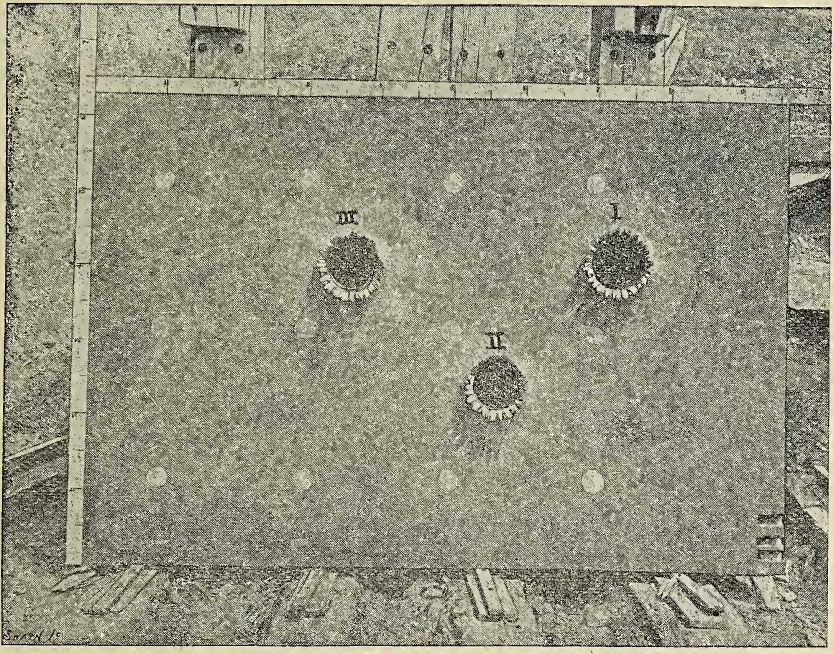


Fig. 2.

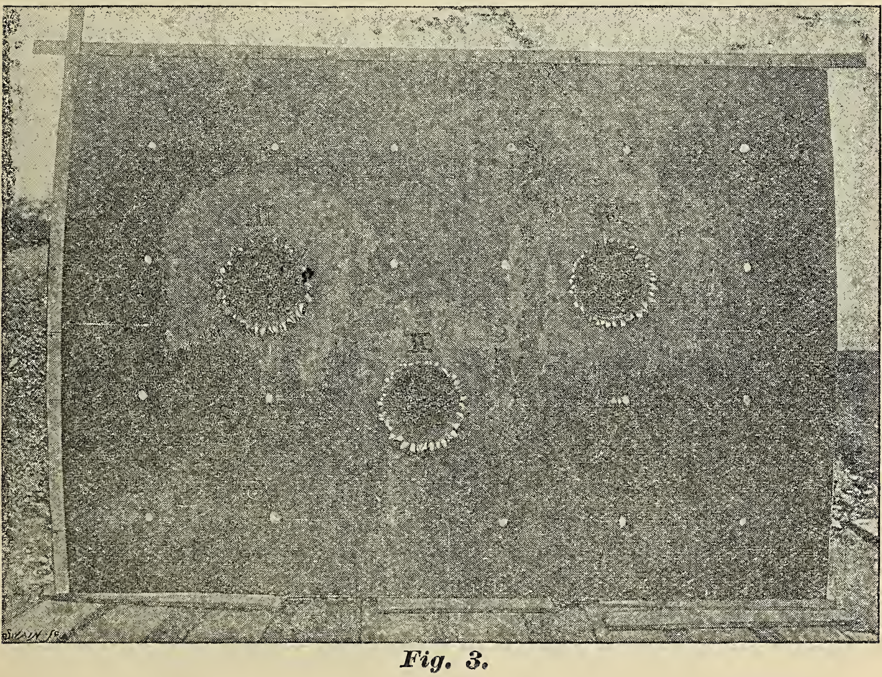


Fig. 3.

plate as was to be expected. It may be seen that the steel is excellent.

Bethlehem 17-inch *Indiana* plate. Fig. 3 shows a Bethlehem barbette shield for the *Indiana,* 12 ft. 1 in. × 8 ft. $4\frac{7}{32}$ in. × 17 in., weighing about 31 tons. It was attacked by three 12-in. Carpenter 850 lb. forged steel projectiles, with striking velocities of 1,322, 1,495 and 1858 f.s. successively. The last, which had a calculated perforation of 25·5 in. of iron or 20·4 in. of ordinary steel, perforated the plate. The projectiles were excellent, the two first rebounding for a great distance intact. The toughness exhibited by both these plates is remarkable. They represent as above said armour on battle-ships, but are the beau ideal rather of armour for inland forts intended to bear breaching attack.

Texel competition, 1898. On Aug. 23rd and 24th took place a competition of armour plates at Texel, when plates from the following firms were submitted to trial: Brown, Cammell, Vickers, St. Chamond, Schneider and Krupp. The dimensions were 6 ft. 7 in. × 4 ft. 11 in. × 5·9 in. (or 2^{m} × $1{\cdot}5^{m}$ × 15^{cm}). They were attacked by a 12^{cm} (4·72 in.) gun firing steel projectiles, each weighing 26 kg. (57·3 lbs.).

The results are shown in the following table :—

No. of round.	Striking velocity.	Penetration in inches.—Remarks.					
		Vickers.	Cammell	St. Cham'nd	Krupp.	Schnieder.	Brown.
No. 1	440 m.s. 1444 f.s.	6·9	6·9	6·4	6·9	7·2	6·9
" 2	480 m.s. 1575 f.s.	8·1	11·6	7·4	8·0	head broke off in plate.	head broken off in plate.
" 3	500 m.s. 1640 f.s.	2·1 shot brok'n	Through	nearly through.	Through	Through	Through
" 4	540 m.s. 1772 f.s.	shot brok'n up.	Through	Through	Through	Through	6.3, shot broken up
" 5	573 m.s. 1881 f.s.	shot brok'n up.	Through	Through	Through	head broke off in plate.	Through
" 6	440 m.s. 1444 f.s.	6·5 shot brok'n	—	—	—	—	—
" 7	440 m.s. 1444 f.s.	7·1	—	—	—	—	—

The whole of the plates were said to have hardened faces except the St. Chamond and the result as shown by the table is very curious and brings out the action of a hardened face in a remarkable way. It may be seen that at the low velocities the shot remained unbroken and in every instance entered more deeply into the face hardened plates, so-called, than into the St. Chamond, because doubtless this latter plate was harder in its mass than the others, but when the striking velocity reached about 1,603 f.s. the hard face began to break the points of the shot and the tables were turned whenever this took place. It never did its work in Krupp's and Cammell's plates and the photographs show Krupps plate in all appearance unhardened with distinct fringes round the shot holes. Cammells plate was slightly hardened, but not sufficiently to break the shot point. In other cases the faces broke the shot points when the velocity reached about 1,600 f.s. The contrast between the Vickers plate and the St. Chamond deserves notice. At 1,640 f.s. velocity the shot which had hitherto penetrated deeper in the former plate broke up with 2·1in. penetration, while it got nearly through the St. Chamond plate. Two extra rounds were fired at the Vickers with low velocities, which again entered deeply because the points did not break, for though in round six the shot broke into three pieces it was not the characteristic smashing into fragments which took place at higher velocities. Vickers plate alone kept all shot out, it was, however, cracked or broken through in more than one direction. The calculated perforation of the fifth round is 10·8 inch of iron. The lesson to be learned from this trial is that to break the shot points and so defeat it; the face must be very hard and the striking velocity over about 1,600 f.s.

Pola competition, 1893,

In the autumn of 1893, a competition took place at Pola for the Austrian Government, for plates 7·87 ft. × 5·9 ft. × 10·6 in., attacked by the 15 c.m. (5·9 in.) gun firing four steel 112·4 lb. shot striking with about 1980 f.s. velocity. A fifth round to be fired at the centre with a steel 24 c.m. (9·4 in.) shot of 474 lbs. with a velocity of 1417 f.s. The calculated perforations of these would be 14·0 and 15·4 inches of iron. To this trial Dillingen, Vickers, Cammell and Witkowitz sent nickel steel plates unhardened, and Vickers and Krupp, plates with hardened faces. The Vickers Harveyed plate and the Witkowitz plates only, were considered to have kept out the smaller shot. The former was fractured by the heavy shot; the latter kept it out without fracture and was therefore preferred.

During the latter part of the year, good Harveyed 10½-in. plates made by Cammell and Brown were tested at Shoeburyness.

In the end of the summer, a Schneider nickel steel plate, 8 ft. × 8 ft × 15·9 in. for the Russian ship *Tria Sviatitelia,* was attacked by 9·4 Holtzer steel shot weighing 317 lbs., with velocities from 1,948 to 2,001 f.s. The greatest penetration was 14·1 inches. The projectiles broke. The calculated maximum perforation is 19·7 in. of iron.

Krupp plate at Chicago.

In the Chicago Exhibition, Krupp exhibited a nickel steel plate with a hardened face, 8 ft. × 6 ft. × 10·23 in., weighing about 9 tons, which had kept out a very heavy attack, including one 8·26 gun shot weighing 307·54 lbs., striking with 1,825 f.s. velocity and 7,096 foot tons energy, implying a calculated perforation of about 18 in. of iron and 788 foot tons energy per ton of plate.

C. E. Ellis on armour, 1894.

On March 15th, at the institution of Naval Architects, Mr. C. E. Ellis, of Brown's, Sheffield, read a valuable paper on armour, in which he gave a large series of results. He estimated that plates then made with heated faces had 50 per cent. more resisting power than their untreated predecessors of 1888. Up to this time nickel had not been adopted in England, owing to difficulties in treating it, and in drilling holes in hardened faces of nickel plates. Plates without nickel had proved at least equal to nickel plates in resistance to perforation, in trials in England at this time.

Captain Sampson and Lieut. Jaques on armour.

Captain now Admiral Sampson, chief of the United States Bureau of Ordnance, contributed a paper in 1894 to the United States Naval Architects on the "Present status of face hardened armour." In this he spoke strongly in favour of nickel and recommended the electric annealing process for softening spots in hard faces in order to drill holes. The electric arc drill process in England had failed to do this when nickel was used and even plates without nickel were dealt with by drilling holes before face hardening. Lieut. Jaques about this time brought out a paper on armour, dwelling specially on the United States trials of thick plates.

Wrinkles in face, 1894.

On May 11th, 1894, at Indianhead, a 6-in. Carnegie steel plate which had been rejected on account of a profusion of face cracks or wrinkles, was found better than any plate hitherto tried.

Rejected U.S. plate.

On May 19th a Harveyed nickel plate for the *Indiana* (see Fig. 4) 15½ ft. × 7½ ft. × 18 in. tapering at the bottom was attacked by 12 in. Carpenter, 850 lb. shot with velocities of 1,465 and 1,926 f.s. It broke across vertically (see A D B in Fig. 4) on the first blow and horizontally on the second and was rejected. A curious noise had been heard during the process of manufacture, but unsoundness could not be detected, it was therefore submitted for acceptance and in its own way is valuable as a record. The wedging effect of a shot whose calibre is nearly one-seventh the width of the plate is considerable, but the plate was poor as to perforation, the first shot penetrating 20 inches.

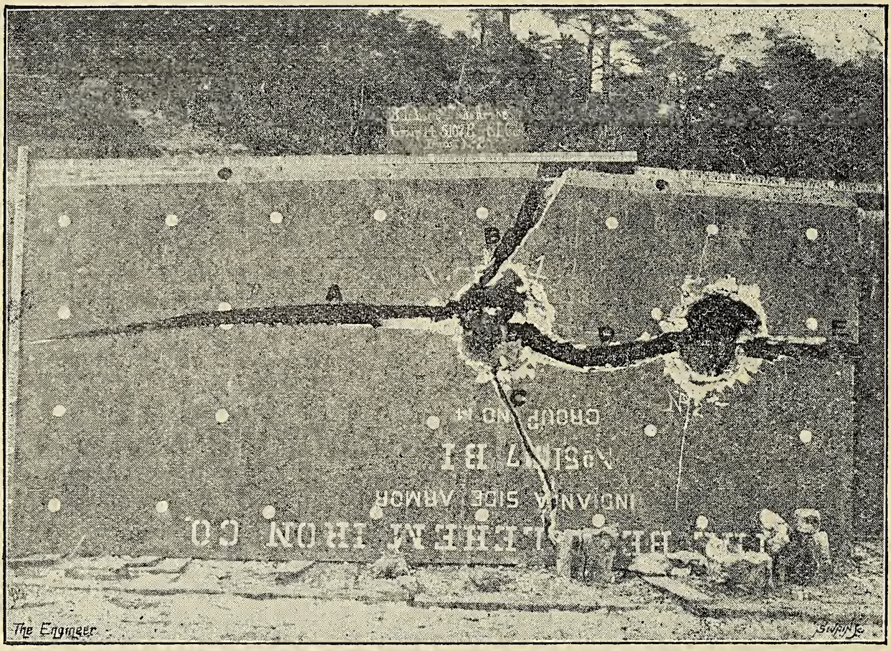


Fig. 4.

Massachusetts Bethlehem plate.

A very different result is shown in Fig. 5, which represents a

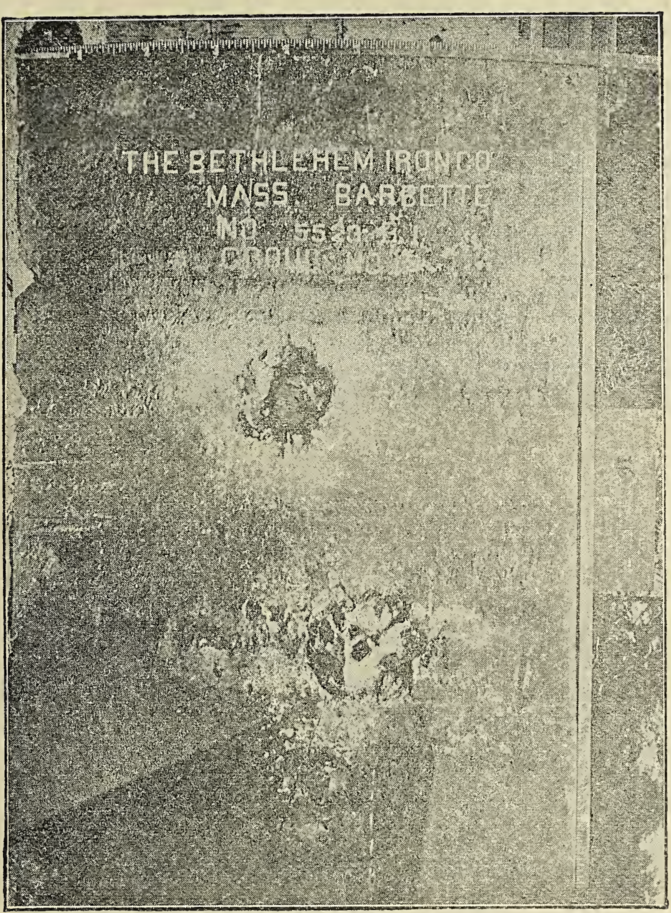


Fig. 5.

Bethlehem Harveyed nickel plate, tested on June 12th, 1894. It was a curved barbette plate for the *Massachusetts,* 12 ft. 1 in. × 8 ft. 4½ in. × 17 in., weighing about 30¼ tons. It was attacked by two 12-in. Carpenter, 850 lbs. shot, with 1,410 and 1,853 f.s. striking velocity and 11,715 and 20,240 ft. tons energy and 18·0 and 25·4 in. penetration of iron. The first shot broke up with about 8 in. and the second with 11 in. penetration and one fine horizontal crack. Other 17 and 18 in. Harvey nickel plates of Carnegie and Bethlehem were tested with good results.

Russian trial secret process capped shot 1894.

On June 28th at Ochta, St. Petersburg, were tested two Harveyed plates, 8 ft. × 8 ft. × 6 in., furnished by Brown and Cammell and one 8 ft. × 8 ft. × 10 in., furnished by Brown. They were attacked by 6-in. shot with 1,850 f.s. velocity for the 6-in. plates and 2,400 f.s. for the 10-in. Projectiles made at the Putilof works on Holtzers system broke up when fired direct or within 10 degrees of the direct line. Certain so-called secret process shot, however, perforated direct and in one case at 25 degrees with the direct or normal line. It was easily surmised that these shot had caps for the following reasons:—Because they were concealed from view. Screens were employed to catch anything becoming detached. The secret was said to be a process applied to existing shot. The energy was found to be calculated for a slight addition in weight. The experiments which had obtained success with wrought iron caps ceased. During the firing something was accidentally seen in an officer's hand for an instant that looked like a cap, with other slight confirming incidents. Subsequently it became more certainly known that caps of hard steel instead of iron were employed. Supposing the shot to weigh 90·9 lbs. at 1850 f.s. velocity, they should perforate 11·8 in. of iron and at 2,400 f.s. 17·4 in., which should carry them through the 6-in. and 10-in. plates respectively if their points were not broken, that is if the plates behaved like ordinary steel, not exceeding 9·4 and 11·9 in. thick. This is what took place on this occasion.

Capped shot.

Subsequently the subject was taken up in the United States as well as in England, and it may be well to deal with the whole question here as far as possible and with this object the inserted tables are given. Group I. consists of selected cases when shot *without caps* perforated plates with hardened faces in an unusually successful way. It will be seen that it is made up of single results, no two occurring on the same day or with the same plate. Group II. consists of results obtained in England and the United States with *capped shot* and Group III. of the *secret process or Russian capped shot.* It may be seen in the last column but one, that the uncapped shot obtained a slightly better result than the capped in Group II. This column gives the relation of the thickness of the plate perforated to the thickness of wrought iron which the shot would be calculated to perforate. The larger this decimal is, the more nearly the shot disposed of the plate as if it were wrought iron.

Capped and uncapped shot

Although at first sight, it may seem strange that the uncapped shot thus slightly beats the capped, it will be seen on reflection to be what might be expected, if as the writer believes, the action of the cap is simply to prevent fracture of the point.[1] For this involves the slight additional work of crushing or otherwise disposing of the cap. In shot the function of the cap is to secure that the shot is not robbed of its effective energy by fracture, but a very small fraction of energy is necessarily expended on the cap itself. Without a cap, the shot nearly always breaks its point and is either defeated or greatly crippled; but in the very rare cases when its point escapes fracture, it ought to be a shade better than a capped shot, so that there is nothing surprising that a table of such rare exceptional results should compare favourably with the normal results of capped shot. If this is correct it is only by accident that this series is not better than the series in Group III. also.

---

[1] It has been held that the cap spreading acts as a sort of lubricant.

Projectiles Recorded as Perforating Harveyed or Krupp Treated Plates.

Group I. (Uncapped.)

No.	Place.	Date.	Plate.	Projectile.			Calculated perforation through wrought iron by Tresidder.	Result.	Relation of actual plate perforated to calculated perforation of wrought iron.	Figure of merit of plate, that is the relation of its wrought iron equivalent to plate
				Nature.	Weight.	Striking velocity.	inches.			
I.	United States	July 12, '94	17-in Harveyed	12-in. Wheeler-Sterling	850	1858	25·5 in.	Passed through plate and backing with slight injury	0·67	1·5
II.	Portsmouth	Aug. 1894	6-in Harveyed	6-in Hadfield bluntpoint'd	100	probably under 1900	under 12·7	Passed through, breaking up	0·47	2·1
III.	Shoeburyness	Oct. 18, '94	6-in Harveyed	6-in Royal Laboratory	100	ditto	12·7	Point 3·4-in. through, shot unbroken but set up	0·47	2·1
IV.	United States	Feb. 4, '95	14-in Harveyed	12-in. Wheeler-Sterling	850	1858	25·5	Passed through, point broken off	0·55	1·8
V.	United States	June 15 '95	5½-in Harveyed	4-in. Wheeler-Sterling	33	2000	9·7	Passed through uninjured	0·57	1·8
VI.	United States	Sept. 4, '95	14-in Harveyed	12-in. Wheeler-Sterling	850	1800	24·4	Point through, shell broken across	0·57	1·7
VII.	Ru'sia(Ochta)	Nov. 1896	10-in Krupp	8-in ?	192·3 ?	2850	28·3*	Passed through with 700 foot-seconds velocity	0·35	2·8

Note.—The above are supposed to have been fired without cap on the point, but in some cases the doubt arises if this is not an error. Caps of wrought iron or steel were used in the following:—

Group II. (Capped.)

VIII.	Shoeburyness	Oct. 1894	6-in Harveyed	6-in Royal Laboratory	100	1858	12·3	Passed through, breaking up	0·49	2·1
IX.	Shoeburyness	Oct. 1894	6-in Harveyed	6-in Royal Laboratory	100	1888	12·6	Passed through, breaking up	0·48	2·1
X.	United States	April 30 '96	7-in Harveyed	6-in Johnson solid	100	?	—	Passed through, slightly deformed	—	—
XI.	United States	Sept. 10 '96	10-in Harveyed	6-in Johnson solid	105½	2505	19·5	Passed through with base broken on one side	0·51	2·0
XII.	Shoeburyness	Aug. 1897	6-in Harveyed	6-in Hadfield	100	1940	13·2	Passed through, breaking up	0·45	2·2
XIII	Shoeburyness	Aug. 1897	6-in Harveyed	6-in Hadfield	100	1960	13·4	Passed through, breaking up	0·45	1·9

Note.—The following were secret process, so-called magnetic shot; being doubtless shot capped with steel caps, probably hard steel and possibly attached by magnetism:—

Group III. ("Magnetic," so-called.)

XIV.	Rus'ia(Ochta)	June 28 '94	6-in Harveyed	6-in Holtzer.	90·9	1843	11·6	Passed through, fired direct	0·52	1·9
XV.	Rus'ia(Ochta)	June 28 '94	6-in Harveyed	6-in Holtzer.	909	1843	11·2	Passed through, fired at 15 deg. to normal	0·54	1·9
XVI.	Rus'ia(Ochta)	June 28 '94	6-in Harveyed	6-in Holtzer.	90·9	1843	10·9	Passed through, fired at 20 deg. to normal	0·55	1·8
XVII.	Rus'ia(Ochta)	June 28 '94	6-in Harveyed	6-in Holtzer.	90·9	1843	10·5	Passed through at 25 deg., breaking up ...	0·57	1·8
XVIII	Rus'ia(Ochta)	June 28 '94	6-in Harveyed	6-in Holtzer.	90·9	1840	11·6	Passed through direct	0·52	1·9
XIX.	Rus'ia(Ochta)	June 28 '94	6-in Harveyed	6-in Holtzer.	90·9	1840	11·2	Passed through at 15 deg.	0·54	1·9
XX.	Rus'ia(Ochta)	June 28 '94	10-in Harveyed	6-in Holtzer.	90·9	?	—	Passed through, fired at 8 deg. to normal...	—	—
XXI.	Rus'ia(Ochta)	June 28 '94	10-in Harveyed	6-in Holtzer.	90·9	2390	11·5	Passed through, fired at 8 deg. to normal ..	0·87	1·2

* The work expended in getting through is equivalent to the perforation of 27 in. of iron.

Group III. show a still slightly better result for the Russian capped shot, that is an average of 0·59 as compared with 0·52, if the whole of the first group are taken and as 0·55 if the last round (which is exceptional[1]) is omitted. If this indicates anything it is that the steel cap of the shape and hardness employed in Russia was better than those of soft steel used elsewhere. The first round of the first group and last of the last probably indicate inferiority in the plate. This is an important matter, but it is better to give the tables and not occupy further space in discussing the results. The main conclusion to be drawn from the experiments made with caps is that a hard faced plate defeats a shot simply by fracture of point and that such fracture can in a great measure be prevented by a cap, which protects the point when it meets the hard skin, whether the cap is hard and shattered or soft and crushed. It has been urged against caps that they are useless against compound armour and also at angles of incidence exceeding 20 degrees with the normal. The answer is that under circumstances when the point is not fractured, the cap can only be rather a hindrance than otherwise, so that it can do no good against ordinary compound armour, but the harm is scarcely appreciable and compound armour is comparatively easily dealt with and is being superseded by hard faced steel, so that every day the value of the cap increases. As to oblique impact, one Russian shot perforated at 25 degrees (see table) and it appears probable that either by adopting hard caps more like the Russian, or by other improvements, better results may be obtained than we have hitherto got[2]; but apart from this, if the cap enables shot to perforate armour within 20 degrees of the normal or direct line, which would otherwise defeat it hopelessly, and if it does no appreciable harm at more oblique angles and in the attack of compound and softer armour, surely it should be adopted.

Certain advantages of caps.

Hadfield's points 1894.

It may be here mentioned that Hadfield has sought to prevent point fracture by modifying the form of the point, and in August 1894 his projectiles, though broken, perforated plates which defeated Holtzer uncapped shot. The principle is sound and if a blunter point could secure immunity from fracture with as little loss of penetration as a cap, it would undoubtedly be preferable.

Plates for *Indiana* and *Massachusetts*, 1895.

On February 19th, 1895, a 15-in. Harveyed plate made for the turretsd of the *Indiana* or *Massachusetts* received two blows from Carpenter 10-in. 500 lb. shot with 1,539 and 1,940 f.s. striking velocity. The last had an energy of 13,050 foot tons and a calculated perforation of 22·9 inches of iron. The shot only entered to depths of three and five inches respectively, caused no cracks and broke up. The result must closely have resembled that shown in Fig. 5.

Oregon belt plates, 1895

On May 1st, 1895, at Indianhead, an 18-in. Harveyed plate for the *Oregon* belt bore two blows from 12-in. Holtzer projectiles, weight 850 lbs., with striking velocities of 1,465 and 1,926 f.s., forming the cracking and perforating tests, that is to say the plate must not crack under the first blow and it must not be perforated by the second. Both shot broke up without perforating. The second shot only cracked the plate which thus was accepted. Subsequently a 13-in. Carpenter shot, weighing 1,100 lbs., struck it with a velocity of 1,810 f,s., an energy of 2,500 foot tons and a perforation of 26·9 in. of iron and was broken up, making a crack or fracture 3 inches wide.

---

[1] *i.e.*, fired at an extraordinarily high velocity and going on with some remaining velocity.

[2] The committee on ordnance obtained many results which are not here given on which the above objections are based.

U.S. racking and perforating tests.

In March, 1895, an 18-in Carnegie Harveyed plate also for the *Oregon* belt, had borne cracking and perforating tests nearly as above.

Double forging.

Owing to difficulty in applying the Harvey process satisfactorily to thick armour, "Double forging" came in. Long exposure to a very high temperature may cause crystallization in the centre of a large mass, and re-forging after the Carburying process is a natural remedy for this evil. It had been tried at least as early as 1892, but the results had not always been encouraging. The following however is a sample of a Carnegie double forged nickel Harveyed steel plate, 8 ft. × 8 ft. × 10 in., tested at Ochta near the end of 1895.

10-in. Carnegie plates at Ochta.

The details of the trial are shown in the following table.

Reforged Carnegie plates 1895.

Round.	Projectile.		Striking velocity f.s.	Striking energy, ft., tons.	Calculated perforation of iron, inches.	Estimated actual penetration.	Relation of calculated iron perforation to thickness of plate.	Striking energy per ton of plate foot, tons.
	Calibre, inches.	Weight, lbs.						
1	6	88	2589	4090	19·2	7·9	1·92	350
2	6	88	2597	4116	19·3	8·5	1·93	351
3	6	87·35	2891	5063	22·6	10·2	2·26	432
4	9	402·7	1879	9856	20·6	11·75	2·06	841

The projectiles were of Poutiloff make. The interesting feature is the high velocities employed. The plate defeated the attack very well, although broken by the last round as shown in Fig. 6.

Iowa 14-in. plate.

On September 4th, 1895, a 14-in. Carnegie reforged plate for the side of the *Iowa* battle-ship was struck by 10-in., 500 lb. Carpenter shot, with velocities of 1,482 and 1,856 f.s. they broke up with about 3½ and 9 in. penetration, no cracks were made. Having thus passed acceptance test, a 12-in. Wheeler, 850 lb. sterling shot was fired with a velocity of 1,800 f.s., the point of which got through and cracked or broke the plate across (see Fig. 7). Captain Jacques wrote of this that it was the best record yet obtained. The perforation of the last round through iron would be 24·4 inches, so that the plate's figure of merit is just about 1·74. Subsequently a 13-in., 1,100 lb. Wheeler Sterling shot was fired with 1,800 f.s. velocity which passed clean through unbroken.

6-in. reforged Carnegie plate 1895.

In the summer of 1895, at Indianhead, a reforged Harveyed Carnegie 6-in. plate (that is an 8-in. reduced by reforging to 6-in.) was attacked by a 6-in. gun firing Wheeler, Sterling and Carpenter shots, striking with a velocity of 2,100 f.s. One shot of each make welded its head into the plate, slightly cracking the latter. The projectiles were thus defeated by a plate 1 calibre thick. The calculated perforation in iron is 14·9 or 2·5 times the thickness of the actual plate assuming the shot to weigh 100 lbs. This figure is extraordinary, especially considering that Wheeler, Sterling and Carpenter shot were employed.

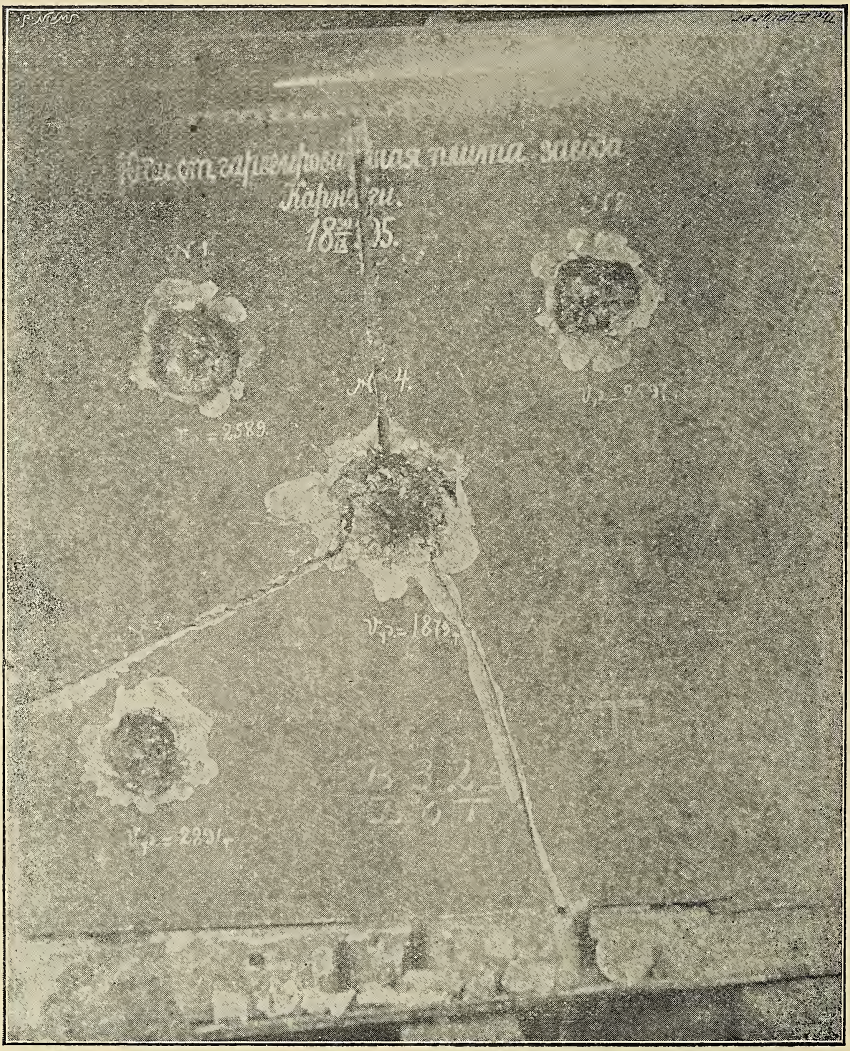


Fig. 6.

Sterling A.P. shells.

Some Sterling A.P. shells termed "semi-armour piercers" were tested during the summer. They are expected to perforated a Harveyed plate equal to $\frac{2}{3}$ their calibre without exploding the bursting charge.

In the meantime further trials had been made of the Krupp process plates as described in a paper in *Stahl und Eisen,* by J. Castner, September 15th, 1895. After referring to the adoption of nickel and chromium by St. Chamond and nickel by the United States, the difficulties of overcoming liability to blow-holes and blisters in the Krupp process are mentioned, also the difficulties experienced with thick plates. The eventual production of plates with hard faces graduated into tough foundations is reported and the results of

Krupp process armour, 1895.

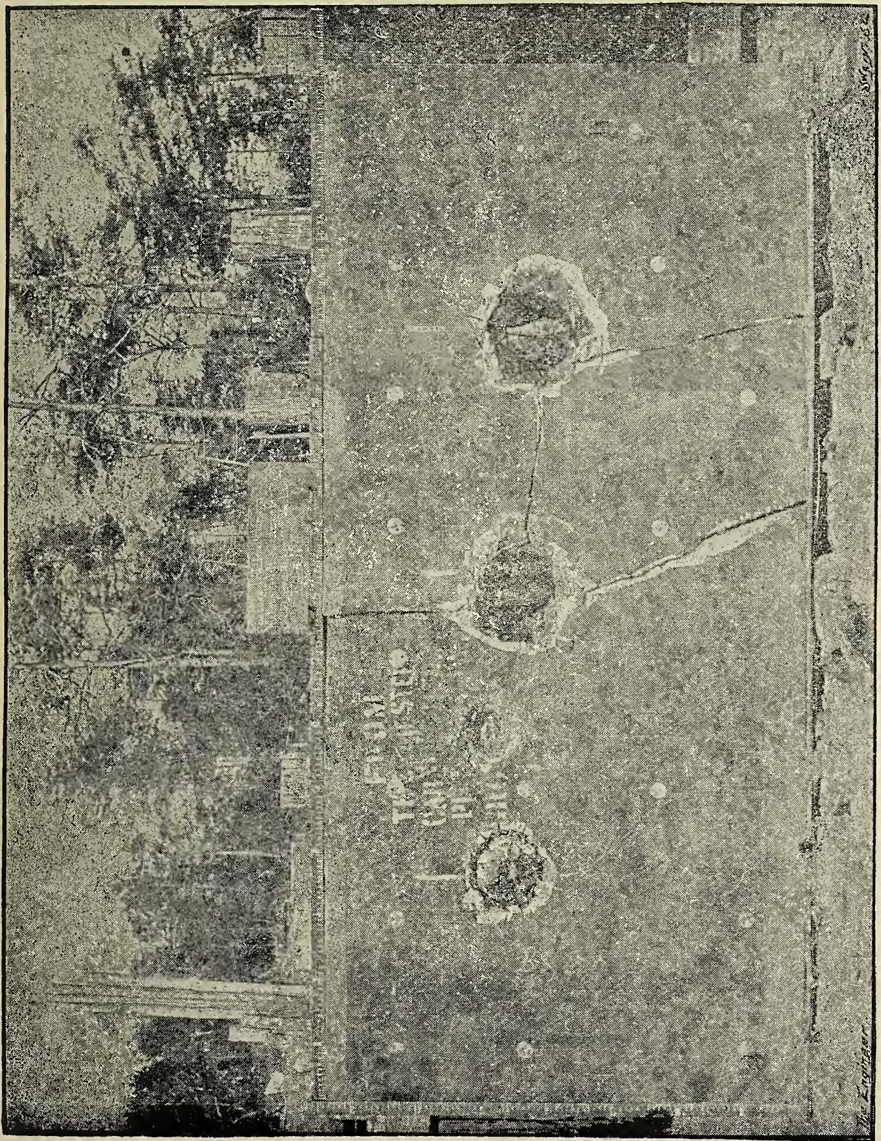


Fig. 7.

remarkable trials which took place on December 15th and 17th, 1894 and on March 15th and 16th, 1895, in the presence of representatives of the German Navy are described.[1] The following are selections from the series of results. Figs. 8, 9, and 10 show the

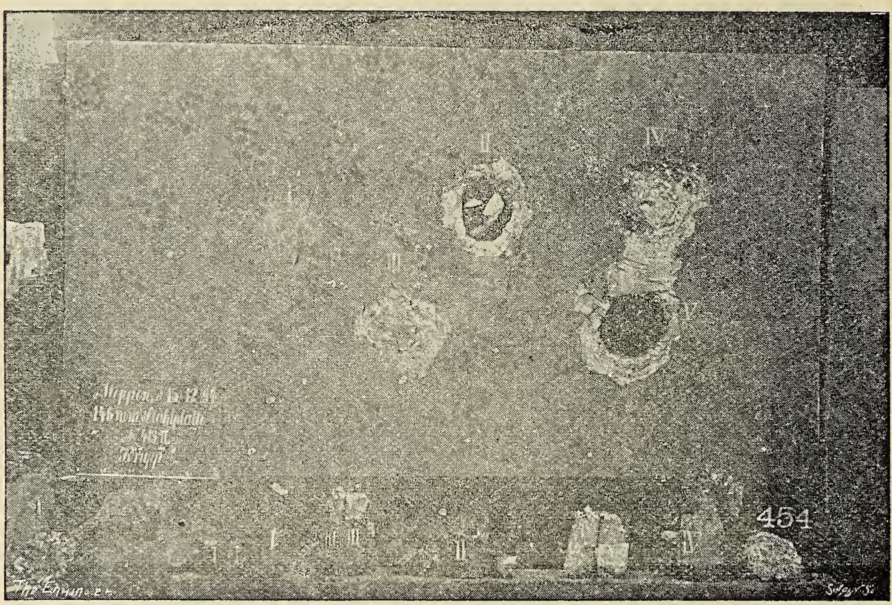


Fig. 8.

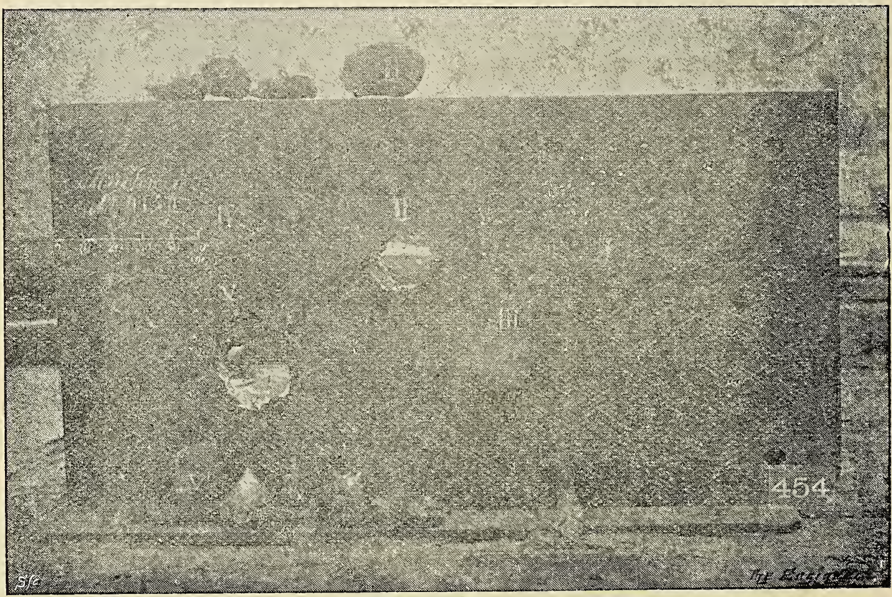


Fig. 9.

---

[1] The writer also in course of direct correspondence with Krupp, obtained official photographs from which the figures here given are taken

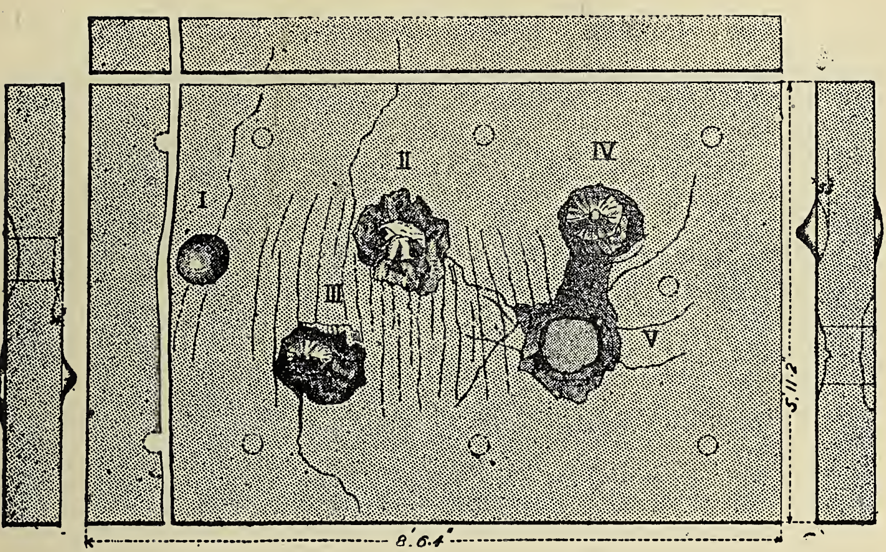


Fig. 10.

results of an experiment made to ascertain if hair furrows, wrinkles or surface cracks, 26 in all in a 5·75 in. Krupp nickel plate acted injuriously. The plate was 2·73^{m} × 1·5^{m} (8 ft. 11·1 in. × 4 ft. 11 in.) and weighed about 4½ tons. The following table shows the attack made.

No. of round.	Calibre in		Weight of shot	Striking velocity.	Perforation through iron.	
					Fairburn.	Tresidder.
	c.m.	in	lbs.	f.s.	inches.	inches.
1	15	5·9	112·4	1560	10·4	10·2
2	15	5·9	112·4	1891	12·8	13·6
3	15	5·9	112·4	1734	11·7	11·8
4	21	8·27	209·4	1431	10·9	10·3
5	21	8·27	209·4	1641	12·7	12·6

It will be seen by the figures that only rounds 2 and 5 perforated. The shot most nearly matching the plate is No. 3. This gives the plate a figure of merit of 2·05, that is it equals 2·05 times its thickness of wrought iron. This is not near so good as the above mentioned Carnegie 6-in. plate as to perforation, but it is a very tough plate as shown by the absence of cracks. Another 5·75-in. plate gave a much better result, defeating a 21 ^{cm} (8·27 in.) shot with 13·5 in. calculated perforation and striking energy of 7,424 foot tons, implying a figure of merit of 2·35 and 1,584 foot tons energy per ton of plate.

The most remarkable plate of the series "No. 432 U," see Fig. 11, was 3^{m} (9 ft. 10·1 in. by 1·9^{m} (6 ft. 2·8 in.) by 300 ^{mm} (11·81 in.) and weighed 13·27 tons. The following table shows the attack on it.

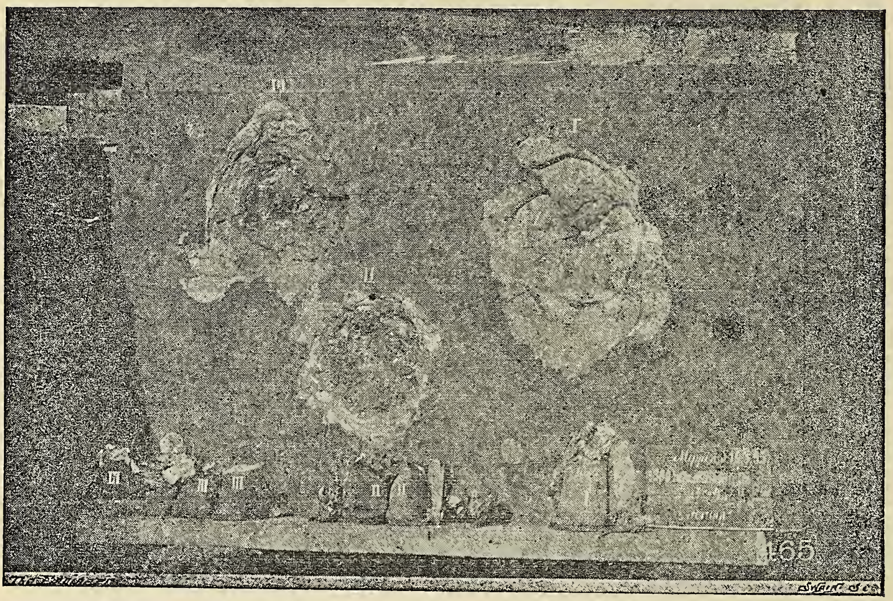


Fig. 11.

Krupp 11·81 in. plate, 1895

No. of round.	Calibre in		Projectile, weight.	Striking velocity.	Calculated perforation of iron.
	c.m.	inches.	lbs.	f.s.	inches.
1	30·5	12·01	716·1	1753	21·5
2			715·4	1889	23·9
3			712·7	1993	25·9

All the projectiles were broken up without effecting perforation (see Figs. 11 and 12) and there were no serious cracks. Round No. 3 was a tremendous test both as to perforation and shock. The figure of merit or relation of actual plate to theoretical perforation of iron is 2·19. The striking energy is 19,630 foot tons or 1,479 foot tons per ton of plate. The plate entirely defeated the attack and exhibited an extraordinary combination of hardness and toughness. The projectile was very large in comparison to the area of the plate, forming a wedge of a diameter nearly one-sixth the width of the plate. The plate is a champion one, selected by the makers and not bent to form; but allowing for this, the result was a remarkable success for a thick plate and up to the present moment has been hardly ever equalled and never beaten. In fact the only plate comparing well with it is the Vickers 12-in., tested in 1897 (to be given hereafter) made by the same process.

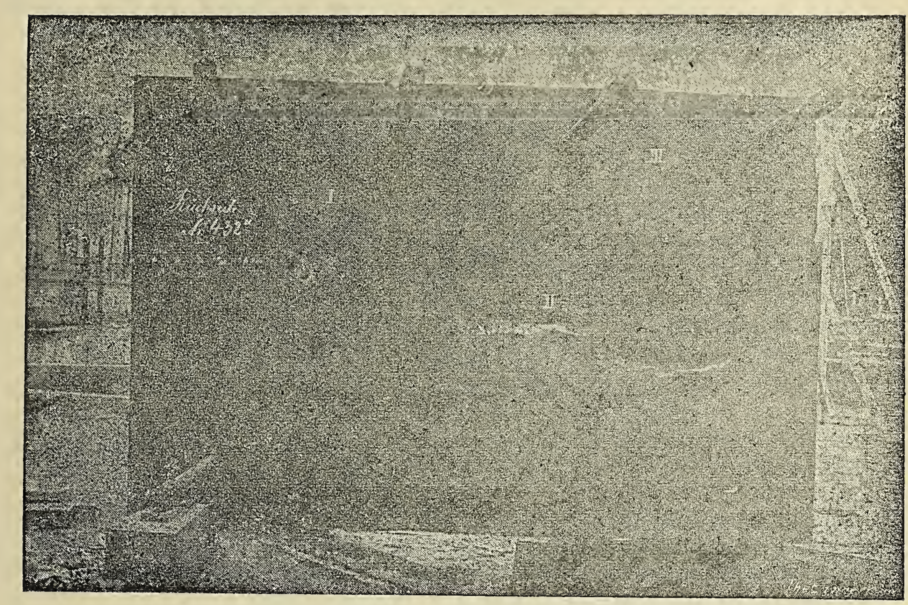


Fig. 12.

Unhardened nickel plate.

One more plate of a totally different character may be given. It was an unhardened nickel steel plate, 8 ft. 6·4 in. by 5 ft. 11·3 in. by

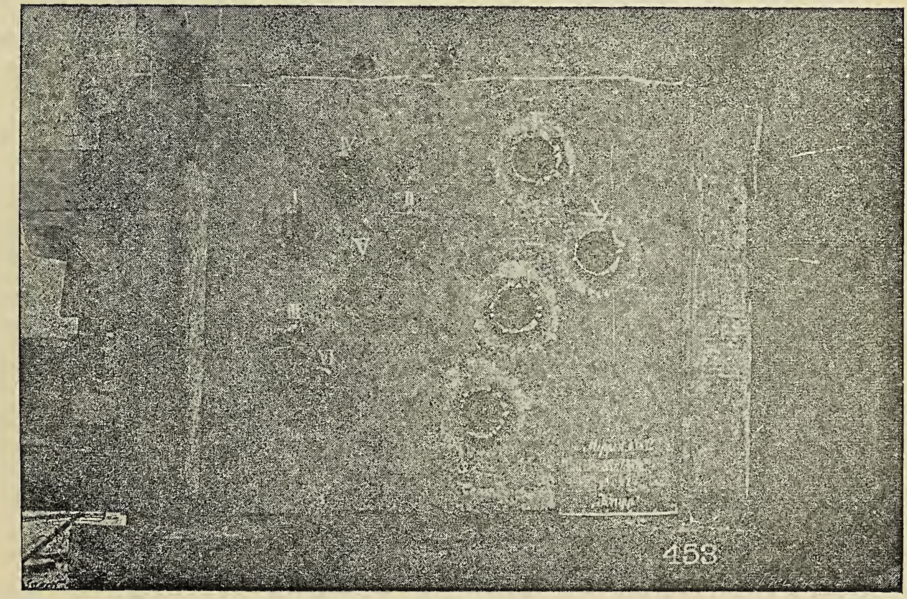


Fig. 13.

6·10 in., weighing 5 tons 6·1 cwt. It was subjected to the attack shown in the table below. Fig. 13 shows the plate after the attack.

No. of round.	Calibre in		Weight of shot.	Striking velocity.	Perforation through iron	Perforation achieved.	Effect.
	c.m.	inches.	lbs.	f.s.	inches.	inches.	
1	12	4·72	57·32	1641	8·8	7·0	Projectile set up 0·35 in.
2				1690	9·2	7·2	" " 0·43 "
3				1894	10·9	9·6	" broken.
4				1950	11·4	9·4	" "
5	17	6·69	169·8	1408	10·5	Through	" set up 0·08 in.
6	12	4·72	57·3	2148	13·1	Through	" broken.
7	15	5·91	112·4	1338	8·1	6 7	Projectile unbroken, but set up amounts not exceeding 0·81 in.
8				1516	9·7	10·8	
9				1566	10·2	9·5	
10				1636	10·9	Through	

This plate had thus borne, it is observed, blows whose total energy amounted to 5,109·9 m.t. (16,500 foot tons). The report concludes by noting that the plate had shown striking qualities, having great toughness combined with an amount of hardness which offered great resistance to penetration.

This verdict is well supported, for it may be seen that shot whose calculated perforation exceeds 10 in. of wrought iron or 8 in. of ordinary steel and in one case 11·4 in. of iron or 9·1 of ordinary steel and which should therefore have easily perforated this unhardened plate, whose thickness was only 6·1 in. were stopped by it, although their points got through. The three projectiles striking with a velocity 1,894 f.s. or over, broke up, while the whole of the remainder set up more or less, the maximum amount being 0·81 in. This plate appears to be the *beau ideal* of what is required for an inland shield intended to bear the long continued attack of siege guns of medium power. In the latter part of 1896 nickel was employed by our Sheffield makers in their Harveyed plates and not long afterwards the Krupp patent was purchased by them. Messrs. Cammell considered however that as good results were to be obtained by the Harvey process, nickel being employed; but at Vickers and Brown's the Krupp process was said to offer the special advantage of producing thick armour plates of such toughness that it is impossible to break them through. In hardness, all the Sheffield makers considered that Harveyed armour rivalled that of Krupp. The writer thinks that no unprejudiced person can fail to conclude that the results already given establish the great toughness. Unquestionably, however, the introduction of the Krupp process was very costly and troublesome and considerable experience is needed to prevent disappointment and to secure the high qualities which are attainable under certain conditions.

Nickel adopted in Sheffield, 1896.

Krupp process purchased by Sheffield makers, 1896.

In support of this it may be noticed how very few of these admirable thick plates have yet been brought forward.

Increase in stringency of tests in supply of armour, 1896.

About the same time, that is the latter part of 1896, the service test for British armour was made more stringent, a 6-inch plate being called upon to defeat the attack of five six-inch Holtzer shot, striking with a velocity of 1,960 f.s. Also it was decided to subject thick plates to regular firing tests to govern supply.

The following experiments with plates and projectiles took place during 1896 in the United States.

In the beginning of the year an 8-inch curved plate of Carnegie Harveyed nickel steel armour was rejected for fracture when attacked by 6-in. projectiles, with perforations equal to 10·8 in. and 12·3 in. of iron, so that the plates resistance established a "figure of merit" of 1·4 and 1·5. Each shots weight was 100 lbs. and their velocities were 1,689 and 1,846 f.s. The plate resisted perforation but not fracture by the first blow. A curved Carnegie Harveyed plate, 7 in. thick, on February 12th, defeated and broke up Carpenter and Wheeler Sterling 6-in. projectiles, with 1,620 and 1,821·5 f.s. striking velocity and 1,820 and 2,287 foot tons energy. One fine surface crack was made. The figures of merit thus established are 1·4 and 1·7 and the energies per ton was 151·8 and 190·8 foot tons, which are very low, probably the projectiles were very good but the test as a pass is mild.

Figs. 14 and 15 show a 15-in. Harveyed nickel Carnegie plate under

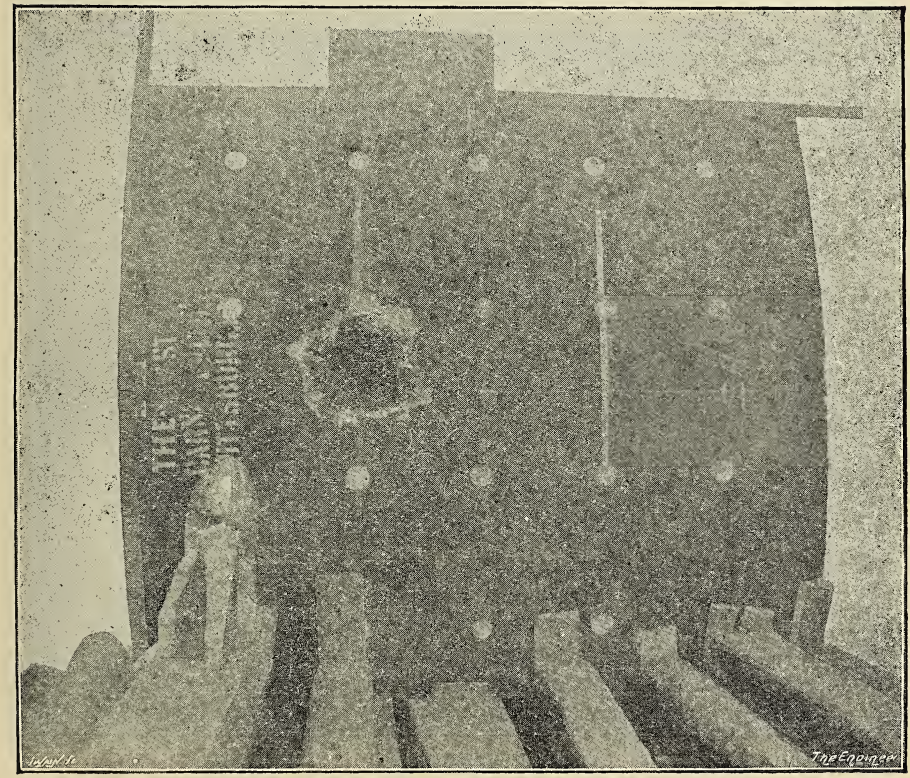


Fig. 14.

the attack of a 12-in. gun firing 850 lb. projectiles as shown in the table (page 482).

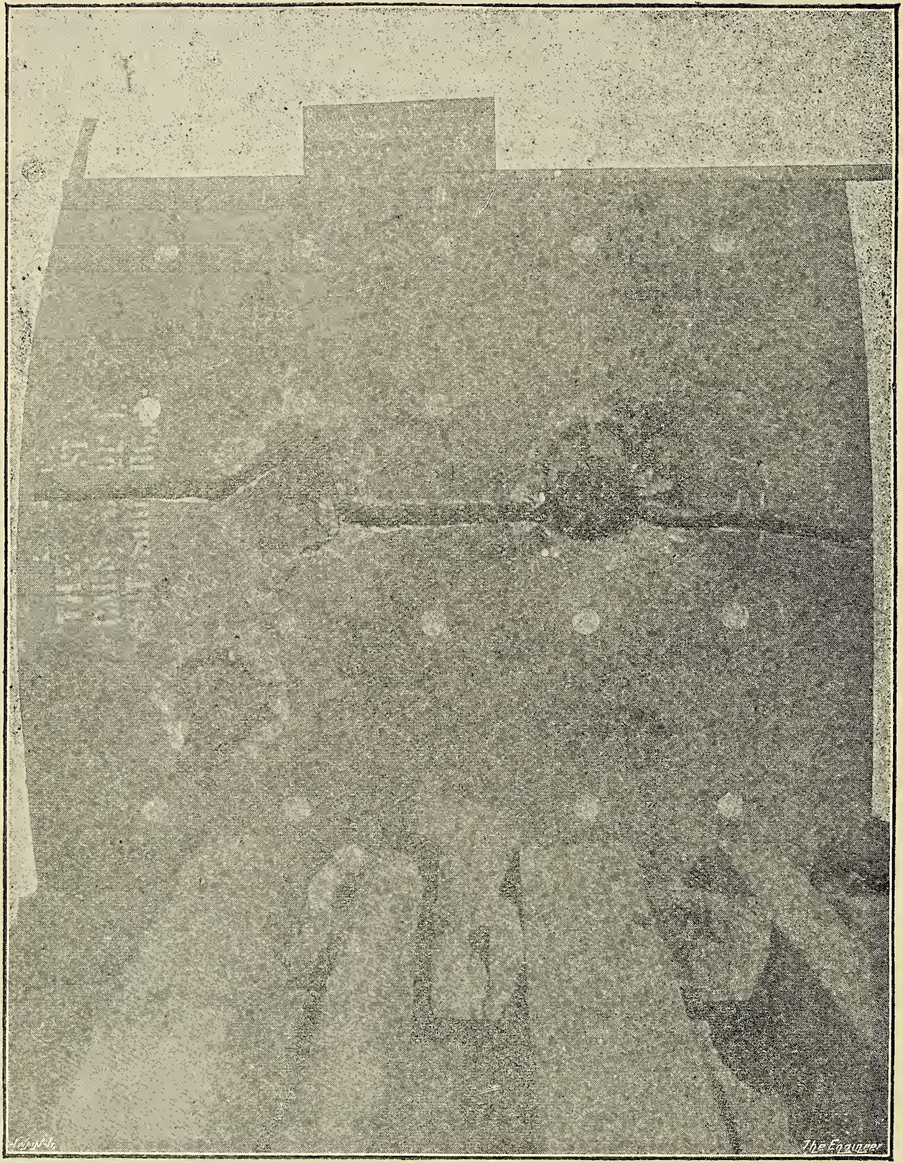


Fig. 15.

Carnegie barbette 15-in plate.

Projectile.	Striking velocity, f.s.	Striking energy, foot tons.	Energy per ton of plate, foot tons.	Calculated perforation of wrought iron, inches.	Relation of perforation to thickness of plate.
1.—Wheeler Sterling ...	1413	11,770	401	17·0	1·13
2.—Carpenter	1760	18,260	622.2	23·6	1·58
3.—Wheeler Sterling ...	1727	17,570	598·0	22·9	1·53

Fig. 14 shows the effect of the first round, which penetrated 13·25 inches without cracking the plate or breaking bolts. The shot rebounded 100 ft. and split in two. The second shot broke up leaving its head embedded in the plate and breaking the plate through the two shot holes. The third shot broke up as shown in Fig. 16, opening the horizontal crack to the extent shown inFig. 15.

While the resistance of this plate falls far short of that of the Krupp 11·1 in. plate already given, it must be remembered that it is selected as (if possible) the worst of a batch supplied for service and bent to the required form. The plate was clearly capable of entirely defeating the last round with a perforation of 1·5 times its thickness of iron and delivering a shock of 600 foot tons per ton of plate and this test is a fairly severe blow for a sample of manufacture.

5-in. Harveyed plates for Russia.

On March 24th, 1896, at Indianhead, was tested the first 5-in. double forged Harveyed Carnegie armour to govern supply of 350 tons of armour to Russia. The plate entirely defeated the attack of five 4-in. projectiles, with striking velocities varying from 1,660 to 1,760 f.s. These broke up with penetration not exceeding 2 inches. A crack was made in one corner. A 5-in. shot with 1,705 f.s. velocity caused a vibration which detached a fragment at the corner. The armour was passed as most satisfactory. The calculated perforations are 8 and 9½ in. of iron. The plate, therefore, defeated an attack equivalent to 1.85 of its thickness after repeated blows equal to 1·61 of its thickness or established a figure of merit up to 1·85.

(To be Continued.)

ON THE WORD "GONNE" OR "GUN."

BY

LIEUT.-COLONEL H. W. L. HIME.

ACCORDING to Mr. H. W. Weber, the editor of "Metrical Romances," a collection published at Edinburgh in 1810, "Kyng Alisaunder" is "one of the most ancient of the English romances." The oldest MS. of it is in the Bodleian Library, and "it is evidently of the 14th century." In this poem we find the following lines (3267–8) :—

> "Theo othre into the wallis stygh,
> And the kynges men with gonnes sleygh."

(The others mounted upon the walls and slew the king's men with guns).

On these lines Mr. Douce, formely keeper of the MSS. in the British Museum, remarks ("Met. Romances," III., 307) :—"we have here, perhaps, the earliest use of the word *gonne* that can be adduced." Gonne, he continues, certainly signified "a machine for expelling balls of some kind, or pellets as Chaucer called them ; but it by no means follows that gunpowder was" necessarily "used for that purpose . . . . A gonne might have originally been a machine of the catapult kind ; and on the adoption of powder, having changed its form, might still retain its name, whilst the explosive would take the name of *gunpowder*." That *gonne* completely changed its meaning at some indefinite period, had been distinctly asserted two centuries earlier by Selden ("Table-talk," p. 107) ; and the following passage from the romance of "Sir Tryamoure," written in the reign of Ed. II. (1307-27), proves that it was originally applied to machines of the catapult species. King Aragus, we are told :—

> " . . . ordeyned hym ful well
> With gonnes, and grete stones rounde
> Were throwen downe to the grounde (955)."

"I once" (goes on Mr. Douce) "thought *gonne* to be a contraction of *engine* until I found Chaucer using the words *ginne* and *gonne* together. Somner has plausibly enough derived it from *mangona*, or *mangonal* which was a machine for throwing stones ; but this is objectionable, inasmuch as both machines were in use at the same period." We find guns and mangonals mentioned together in Langland's "Vision of Piers the Ploughman," a poem begun in 1362 and revised by its author in 1377 (Passus, XXI) :—

> "Set bows of brake • and brazen guns,
> And shoot out shot enough • His sheltrums to blend.
> Set Mahound at the mangonal • and milk-stones throw,
> With crooks and with calthrops • a-cloy we them each one !"

(Set crossbows with levers, and brazen guns, and shoot shot enough to blind his squadrons. Set Mohammed at the mangonal; throw mill-stones and crooks and crows-feet, to frustrate each squadron of them).

Guns and gynnes appear together in the "Romaunt of the Rose" (4175–6), a poem attributed to Chaucer who died in 1400 :—

"They dreddé noon assaut
Of gynné, gunné, nor skaffaud."

(They dreaded no assault by machine, gun or skaffolding).

Of the many derivations of the word *gonne*, the most plausible seems to be that which deduces *gonne* from *gonner*, and takes *gonner*=*gunner*=*guigneur*=an aimer or layer, from *guigner*, to aim with one eye. All *armes de jet* must have been aimed in some way, however roughly.

Was the word *gonne* used by the unknown author of "Kyng Alisaunder" in its old, or in its present sense ;—as signifying a machine which ejected projectiles by mechanical means, or a piece of ordnance in which gunpowder was used? We are bound in reason to assign to it the meaning in which it was used by writers of the period at which the romance was written. Two questions, therefore, present themselves to us: first, when was the poem written; and secondly, what meaning was assigned to the word by contemporary writers?

Mr. Weber says the Bodleian MS. belongs to the 14th cent. This statement is no doubt substantially correct, but it is so vague as to be of little value to us. Can we not narrow the period? Fortunately we can, thanks to an observation made by M. Paul Meyer, of the French Institute, in his "Alexandre le Grand dans la litérature française," Paris, 1886; II., 64. When studying "Kyng Alisaunder," M. Meyer observed that one of the books made use of by the author was the "Polychronicon" of Ranulfus de Hygden, a monk of the abbey of St. Werburg in the diocese of Chester. This work comes down to the year 1367, in which its author died. "Kyng Alisaunder," therefore, must have been written after the year 1367, *i.e.*, in the latter half of the 14th cent.

What was the meaning of the word *gonne* at this period? In a note (under 'Gunne') to his edition of the "Promptorium Parvulorum," an English-Latin Vocabulary of the year 1440, Mr. Albert Way quotes a passage from a MS. by Arderne, an English surgeon who lived throughout the second half of the 14th century, which shows beyond any doubt that he used the word *gonne* in *our* sense. This passage will presently be given at length.

Gonne is also used in its modern sense in the passage quoted above from "Piers the Ploughman." Satan is giving orders for the defence of Hell (against the Saviour), and the poet names all the *different* weapons that occurred to him. Used in its old sense, *gonne* would come under the head of *mangonal*, and would therefore have been quite superfluous. It will be observed, too, that the poet speaks of *stones* for the mangonal and of *shot* for the *gonne*. I cannot at this moment recall any instance of the projectiles of the machines being called shot. The gonnes are further described as brazen. It is most improbable that brass was ever employed as the material for engines of the catapult or ballista type. Brass has neither the strength nor elasticity absolutely necessary for such a purpose.

Whatever may be the meaning of *gonne* in the passage of the “Romaunt of the Rose” quoted above, Chaucer has undoubtedly used this word in its modern sense in the “Hous of Fame,” which Mr. Frank Heath thinks was begun “some years before 1383” (“The Globe Chaucer,” xliii). The passage occurs in Bk. III, 533-4 :—

“As swift as pelet out of gonne,
“Whan fyr is in the poudré run.”

It is clear, then, that *gonne* was generally used in its modern sense in the second half of the 14th century; and we may reasonably conclude that it is used in this sense in “Kyng Alisaunder,” which belongs to that period. Whether the first (known) use of the word in its new acceptation was made by Arderne, Friar Langland, Chaucer or the author of the romance, there are no means of determining.

John Arderne tells us, in his papers which are now preserved among the Sloane MSS., that he began to practice as a surgeon before the middle of the 14th century; that he lived in Newark from 1349 to 1370, when he moved to London; and that he was eventually appointed surgeon to Henry IV, who came to the throne in 1399. He was thus “a surgeon of no mean figure in his time”; and Dr. Freind, from whom I borrow this phrase, formed a high opinion of his professional abilities from a perusal of his MS. medical treatises (Freind's “History of Physick,” London, 1758; II. 325). The reference to the word *gonne* made by this eminent man is conveyed in the following words (as transcribed by Mr. Way) :—“Pernez *j. li.* de souffre vif; de charbones de saux (*i.* weloghe [1]) *ij. li.*; de saltpetre *vj. li.* Si les fetez bien et sotelment moudre sur un pierre de marbre, puis bultez le poudre parmy vn sotille couerchief; cest poudre vault à gettere pelottes de fer, ou de plom, ou d'areyne, oue vn instrument qe l'em appelle *gonne*.”[2] This passage is notable, not only because it is one of the earliest instances of the word *gonne* in its modern sense, but because it is probably the very earliest mention of the composition of gunpowder which is undoubtedly historical and perfectly trustworthy. In modern figures the composition of gunpowder in the second half of the 14th century was :—

Sulphur -	- 11·1′	parts.
Charcoal -	- 22·2′	„
Saltpetre -	- 66·6′	„
	100·0	

---

[1] Anglo-Saxon for *willow*. It may be inferred from this pointed reference to willow, that Arderne was aware of the fact that gun powder manufactured with willow-charcoal explodes less violently than powder in which almost any other charcoal is used;—a matter of vast importance with 14th century *gonnes*.

[2] ‘Take 1 lb. of flower of sulphur, 2 lbs. of willow-wood charcoal, and 6 lbs. of saltpetre. Triturate the mixture very carefully on a slab of marble, and pass it through a fine sieve. The powder thus obtained will project balls of iron, lead or brass from an instrument called a *gonne*.’

PRACTICE SEAWARDS.

— BY —

CAPTAIN J. H. MANSELL, R.A.

In the past the peace target of Garrison Artillery was the anchored barrel. This target was a fair representation of the conditions of attack in the days of sailing ships, which generally anchored and bombarded. It was continued long after the introduction of steam and was the immediate precursor of our present moving targets. The old barrel served its purpose but was continued far too long! Has not the moving target, under the conditions now laid down for its use, fulfilled its purpose? I think that it has, and that the conditions may be altered so as to more nearly assimilate our peace targets to the most difficult ones we shall get in war.

What are the present conditions; the target is towed backwards and forwards in front of the guns at an average range of 2,000 yards, and at a speed of some ten knots. This is a fair representation of deliberate bombardment. But there is another and more difficult attack we may have to meet—the running past attack! If we can stop the runner past we shall surely hit the slow circling bombarder. For some years officers have realised the increased difficulties of meeting the running past attack, and to prepare for it have raised their voices for a faster target. I don't think a faster target is an absolute necessity, but we must alter our conditions.

How does the speed of the target affect us? To study this I will resolve it into its two components; the one at right angles to the line of fire—angular speed; the other along the line of fire—rate of change of range.

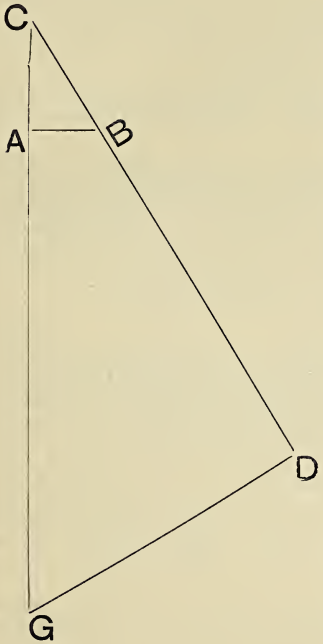
Angular Speed.—This does not affect the B.C.; he has merely to order more deflection. It does not affect the G.G.C. It does affect the gun layer in the highest degreee, and in a minor degree the range takers, as they have to traverse more quickly. A gun layer who has only laid on ten knot boats at 2,000 yards can have no conception of how to keep ahead of thirty knot destroyers. But, if we bring our ten knot boat into a range of 1,000 yards we at once double her angular speed, and thus represent for our gun layer a twenty knot boat at 2,000 yards. So far as angular speed is concerned then a faster target is not a necessity if we will only bring our target in closer.

Angular speed is only of great importance in the training of gun layers. Let us clearly distinguish it then from other conditions and fire some of our rounds at say 600 to 1,000 yards range to train gun layers.

Rate of Change of Range.—This affects the B.C. as regards the range correction he orders, beyond that not at all. It considerably affects the G.G.C. in judging what length of prediction he shall give. It does not affect the gun layer, and does not much affect range takers. It is evident then that the rate the range changes is of chief importance to the G.G.C. and that only in a matter of drill: actual firing is not necessary to teach him how to predict. For drill purposes the rate of change of range may be increased by putting false heights on the range finder. For instance if the true height is doubled the rate of change of range is doubled. In other words a ten knot ship becomes apparently a twenty knot ship.

So far as actual speed is concerned then I think we can train effectively with our present targets on the lines I show. But there is another point in connection with the running past attack, which is of the utmost importance, and on which we get little experience. This point is the total amount the range changes during practice. At present the total alterations in range are very small. A condition for the Centenary Cup is that the difference between the maximum and minimum ranges must be 250 yards. This is a small change in eleven minutes. B.C.'s now find their "corrections" and once found need not alter them; they are getting no experience of how to vary their "corrections" as a target closes on them. Furthermore this point is of the utmost importance to range takers. It is not generally recognised that the focus of the object glass of their telescope varies with the range, and that as the target closes they must alter their focus. With the practically constant range of our present peace target this necessity is not realised. To show the importance of this I may mention that from a height of 30 feet: if a man focuses on a datum 1,200 yards away, and then tries to pick up the range of an object 3,700 yards away without refocusing his object glass, he may have any error up to 6°/₀ of the range. This 6°/₀ means 200 yards and may be either plus or minus. Of course this percentage error varies with the height and the range. At greater heights however, the permissible errors of the guns are less, and the question of re-focus of the object glass remains important.

Can we get targets that will give us a large variation between maximum and minimum ranges? I think we can, but at the expense of a certain amount of rate of change of range. This sacrifice does not appear to be very material.



Suppose we use 600 yards of tow rope. At 3,000 yards range we must have a clear 300 yards ($\frac{1}{10}$th the range) between the towing ship and the target. In the figure let *G* represent the gun, *B* the towing ship, *C* the target. Then *B C*, the tow rope, = 600 yards. If *C G* is a range of 3,000 yards, *A B* must = 300 yards for safety. We thus see that under the above conditions our ship can run in at an angle *G C D*, to the guns, whose *sine* = $\frac{AB}{BC} = \frac{300}{600} = \frac{1}{2}$ or *G C D* = 30°. As the range decreases the size of *A B* for safety decreases, the ship could therefore bend more towards the guns.

Suppose she keeps on the straight course *C B D*, which is preferable. When she arrives at *D*—*G D* being perpendicular to *C B D*—the range *G D* is 1,500 yards, and the angle the guns have trained through (*C G D*) is 60°. After this point *D* the range would increase if she kept on a steady course. *C D* is equal to 2,800 yards. The speed of the ship with 600 yards of tow rope would not I think exceed eight knots. Say it is eight knots—the time from *C* to *D* would be ten minutes. Now the time limit in the competitive for sixteen rounds from 4, 9″ R.M.L. guns in two groups is eleven minutes. Given a clear range, then, sixteen rounds would be got off on the one run by a smart company. The range will have altered from 3,000 to 1,500 yards, and both range takers and B.C.'s will gain great experience. Even if we get faster targets we must surely run them like this to prepare for the running past attack.

To sum up. The condions laid down for competitive practice give the lines on which B.C.'s work, and to attain perfection at which the greater part of their energy must be directed. Beyond testing the general drill of detachments, what does the present competitive test. ?

1. The drill series tests the accuracy and smartness of gun layers in a measure.
2. The 1st service series tests the gun layers, it also tests the B.C.'s powers of observation of fire. It is practically no test of range takers, the range varies so little. Owing to small total change of range, and therefore excessively small rate of change of range, the smartness of G.G.C.'s is not put to a severe test.
3. The 2nd service series, similarly, only really tests gun layers, and the B.C.'s observation of fire. It's chief difference from the 1st series is that the O.C. may select his own details and

the chance of the lottery laid down for the 1st series does not exist. As the chances of casualties now exist for both series, this difference is not so great as it appears.

At present then the competitive mainly tests gun layers and B.C.'s, and these at a ten knot target at 2,000 yards. General training must have a tendency to follow this lead.

If we wish to direct attention to other points which appear to have increased in importance, accepting the proposition that running past is a probable, and the most difficult form of attack to meet, then we must alter the conditions of the competitive.

Briefly the lines I would suggest for the competitive are :—

1. Drill series as at present.
2. Drill series with a ship coming straight at the guns. A false height to be put on the range finder, when possible, to increase the apparent speed. Two rounds per gun to be fired, one round by "ordinary fire" and one round by "salvo fire." The umpires to check the elevation given to the guns with the ranges shown on the dials. A time limit to be laid down.
3. A service series with target going across the guns as at present, but ranges not to exceed 1,000 yards. Eight rounds* to be fired with a time limit.
4. 2nd service series. The target to be run in towards the guns as I have explained. Sixteen rounds* allowed. If the range is clear, the company to fire as many rounds as it can get off on the run, with the proviso that present time limits are not exceeded.
5. 3rd service series. The target to run out at an angle to the guns, say from a range of 1,800 yards to 2,500 yards. Eight rounds* allowed. A time limit to be laid down.

The above only considers the question of fighting with the D.R.F. as at present. I do not attempt to touch the broader aspect of whether fighting by P.F., case II and case III should not be included in our competitive. Other details, such as whether the lottery in Series II should be retained now casualties are introduced, etc. suggest themselves. But all these are outside the purpose of this paper, which is merely to indicate the broad outlines of a change, I would suggest, in our methods of conducting Practice Seawards.

---

* These numbers refer to practice with 9″ R.M.L. guns. They would have the same relative proportions if the competitive were carried out from a different nature of gun, having a different allowance of ammunition.

Note.—This paper was written early in the spring of 1898; its publication has been unavoidably delayed to this late date much to the regret of the Committee R.A.I.—A.J.A.

THE SERVICES
OF
LIEUT.-COLONEL FRANCIS DOWNMAN, R.A.,
IN
FRANCE, NORTH AMERICA, AND THE WEST INDIES BETWEEN THE YEARS 1758 AND 1784.

EDITED BY

COLONEL F. A. WHINYATES, *late* R.H.A.

CHAPTER II.

French fleet enters Choc Bay. Land their troops. Attack General Medows on the Vigie and are repulsed. French troops re-embarked. Their fleet departs. The Governor of St. Lucia capitulates.

On the 16th December, 1778 at daylight, we saw the French fleet some miles to leeward of the island. In the afternoon it was close in shore to the north-westward. We concluded the enemy intended to have another brush at our ships, but they had got such a beating by our batteries and men-of-war that they dared not venture again. In the evening they stood into Choc Bay about three miles to the northward and came to anchor. As soon as it was dark we saw fires on the shore, and three rockets were discharged. This we rightly concluded was the prelude to landing their army. Their small craft left Gros Ilot Bay that they first went into, and came into Choc Bay, and before morning all the troops they contained were landed.

On the 17th, as soon as the dawn of day appeared and objects were to be distinguished, we saw the French army on shore and advancing in large columns. All our pickets and guards posted on the heights on the north side of the town came in, and the enemy took possession.

From thence they fired a few cannon shot at the 46th Regiment stationed on an eminence in the rear of the town. The 46th retired immediately, and none now of the British remained on that side but General Medows, who still kept ground on his Peninsula.

Early this morning I was ordered from the battery by the seaside [No. 4] to the one of four 18-prs. [No. 5]. I have already said it is situated on a high ground, the hill from it down to the bay side being almost of a perpendicular steepness. It not only commands all the harbour, but also the Vigie, the town and all the ground on that side the Careenage. I believe the width of the Careenage to be 600 yards, and the distance from the entrance to the town a mile and a half. The instant I got to this battery I saw an occasion to use a few cartridges I luckily had brought with me to good effect, forcing a column of the enemy to retire that seemed inclined to take post in the skirts of the town.

The French army were now in possession of all the range of hills from above the town down to the Choc Bay side with a number of small cannon placed here and there. We had left the town entirely, but we had a post of the 46th Regiment within a hundred yards of it, immediately at the bottom of the road from the Morne. We had left the town in a violent hurry, for what reason I know not, because if we had chose to prevent it, a Frenchman could not live in it, but so it was. The Commissary, frightened out of his senses, ran away and left some provisions, which were useful to the French. Other people not knowing clearly what they were about left a number of boats and canoes in the town, though at this time we had not such a convenience to send across to General Medows or to do anything else that might be necessary. The enemy, I believe, conceived from our retiring so peaceably as they advanced, that we meant not to dispute any ground with them, but in this they found themselves egregiously deceived. It was in the middle of this night that a body of them silently entered the town, proceeded over the bridge and attacked the pickets of the 46th Regiment; they were soon repulsed with some loss; we also lost men, two killed and six wounded.

On the 18th, at daybreak, we observed the French army in motion, seemingly as if they intended an attack on General Medows. They were marching in strong columns from the hills opposite to us through the woods to their right, and taking post along the seaside and all the ground in our front. About eight o'clock we were convinced of their intention, for through the breaks in the wood we plainly saw three columns directing their course to the Peninsula. One approached by the Choc Bay side, the others proceeding through different roads terminating near an old redoubt, between which and Choc is a low level piece of ground. It was on this ground the enemy formed from their columns before they advanced to the foot of General Medows's hill. Five companies of our light infantry were advanced to the redoubt, and near it, part of whom narrowly escaped being surrounded by the French, who, much favoured by the thickness of the woods, had got close up to them before they were perceived, and but for an exertion of their usual agility a great many must have been taken. As it was Captain Downing, 55th, and another officer and eight men were made prisoners.

The French army in forming on so small a space of ground jumbled the right of one column on the left of another, and were in some disorder, which was not a little increased by the well directed fire of our artillery. However, they soon recovered in some degree, and began their attack assisted by four small cannon. One part of them soon gave way, but were replaced by others, and in this manner, with little alteration of plan and manœuvring, they continued the action for two hours at a distance of not less than 280 yards. At length, after a slaughter and resistance, they were taught not to expect, they retired, some few in confusion, but the greater part in excellent order, bringing four guns to cover their retreat. In a critical moment for the British, the French determined their retreat, for at the time they effected it we had scarcely any ammunition left, the men having collected even what they could from their dead and wounded comrades, and our fire of course was nearly at a stop. General Medows had, however, prudently reserved to each man three or four rounds which, if the enemy had attempted the Hill, were to be given them, and then they were to charge with bayonets. This was the determination of General Medows (though wounded) and his officers. Glorious resolution, truly becoming British soldiers!

You will observe in General Grant's orders that the troops were to land with thirty-six rounds of ammunition only; the field pieces also by his orders had but a small proportion. This security, or inattention, or whatever you may please to term it in our Chief, was very nearly being attended with the most serious consequences—the destruction of 1,300 or 1,400 of our best troops, and perhaps, had they fallen, the whole armament. Why was not more ammunition sent to General Medows when there was an appearance of his being attacked? It was not thought of till it was too late to be of real service, and if it had been, it was to be sent for from our shipping by land, a tedious piece of business, and then a boat had to be found to transport it to the Vigie. It never once occurred to our Wisdoms, that a boat or two would be necessary and useful to us in this bay till the very instant one was wanted, and then everyone bawled out "Where are the boats; where are all the boats?" Says Colonel Chin, "no sir, by mere accident, only one boat secured on this side the bay; very extraordinary." At this very moment there were lying at the town three or four small sailing boats and several canoes, within half musket shot of our advanced picket, but we did not think it a matter of any moment when we were in possession of the town to move them to a place of safety, and now it would be dangerous, though under cover of our own posts, to attempt it.

Why would it be dangerous?

Because the French troops are so near us.

How near pray?

Not a yard less than half a mile.

And, pray sir, why did you leave a quantity of powder and other stores in houses on your own side the water so long at the option of the French, either to set on fire or carry away, when you might in open day have taken them away yourself?

In truth sir, I can assign no cause for such neglect but the one just mentioned—mere accident.

Just about the time the French army was retiring from the field of action, two of their 74 gun ships came to anchor off the harbour of the Careenage and began a heavy cannonade on our batteries; their object no doubt was to cut off communication with General Medows, but the fire was so well returned that in about half an hour they were both obliged to retire, leaving behind them their anchors and cables.

The battery of four 18-prs. [No. 5] which I had the pleasure of directing this day, was, I am proud and happy to say, of great service to the British and destructive to the French troops. I not only galled the latter when advancing, but during the action when the flanks of their several columns were presented to me, and also in their retreat. General Meadows did me the honour to call me his grand ally, and General Grant told me he was much obliged to me. It is a mere feather, yet not unpleasing.

The battery of three 12-prs. [No. 1] on the Peninsula was commanded by Lieutenant Walker and did much execution, though he could not bring all his guns to bear on the enemy, and was in some want of ammunition. The five gun battery [No. 4] at the entrance of the harbour was commanded by Lieutenant Todd, who struck one of the French ships a great number of times. The battery of two 12-prs [No. 2][1] on the rock should have been commanded by Lieutenant Lock.

Lieutenants Yorke and Edwards were with the field guns with General Medows, and contributed not a little to the effusion of French blood this day. They had each some men wounded and only wanted more ammunition to have added much to the slaughter of the enemies. It now remains to mention our loss in these two actions. The navy sustained no greater than ten or twelve men killed and wounded and no damage worth speaking of done to any of the ships. This is wonderful and to account for it we can only say the French ships fired badly and kept at 100 yards distance, yet a great number of their shot went over ours. What the French men-of-war suffered we know not, this only, that several went away lame in their rigging, and the Comte has his nephew killed by a shot from one of the batteries.

The loss of the French army in the action of the 18th, was very few less, if any, than 400 killed on the spot and 1,200 wounded. The fortunate British had only 10 killed and 150 wounded; the officers wounded were, General Medows, Major Harris, and Lieutenants Pratt and Harris 5th Regiment, Captains Daly and Hay (since dead) 28th Regiment, Lieutenant Ross (Brigade Major) 35th Regiment, and Lieutenants Forbes and Gomm, 46th Regiment. We sent a flag of truce in the afternoon desiring them to come and bury their dead. Their boats were all the afternoon going backwards and forwards from the shore taking off as we imagined their wounded. To find a cause for this amazing disproportion in numbers, we must confidently say the British artillery did their duty well on that day. It is not a usual thing with the army to allow much credit to the artillery, let them do ever so much, but on this occasion they have deviated from the common path, and have done us the favour to say our guns were well pointed. We did not want their words to verify this, ocular demonstration is stronger, a more convincing proof. Heads, legs, and arms knocked off, and bodies torn to pieces are not the effect of musketry balls fired at the distance of 300 yards ! I have my reasons for saying the army are very sparing of their encomiums on the artillery. Many times officers have been heard to say on the march, " go on, go on, never wait for the artillery," but I always observed when these unsoldierlike words were pronounced, the enemy were at a considerable distance, and no sooner does the popping begin in front than the tone is altered, " Where are the guns, where are the artillery ?; halt in front and clear the road for guns ! ! " is then the cry. I have often remarked that the army in general look with an envious jealous eye on the artillery, from what cause I know not unless from an idea they entertain of our having more advantages and conveniences than themselves. We go through the same fatigues, often times abundantly more, we are exposed to the same dangers, sometimes greater, by their running away and leaving us to shift for ourselves, when half our men and horses are killed and wounded.*

---

[1] For the various batteries referred to see Plate I.

When artillery are engaged and their fire effectual nothing is too good for them, politeness and attention is carried to 45 degrees, and praises and plaudits ring on every side of us, but, alas the day ! when the General's letter to the Minister appears in publick, no more mention is made of the Artillery than if there were no such people in being.‡ These are mortifying truths, particularly to a corps which upon every occasion when employed have behaved as well, if not better in general than any corps in the King's service.

I shall now proceed with my journal, but first must mention a few matters I think not unworthy of notice, matters which make one wonder we are not prisoners in Martinique instead of being at liberty in St. Lucia. One would think in running them all up that we are the favourites of the Supreme Being, or that a few good ones are amongst us for whom the whole are preserved, or that God is highly displeased with our enemies, for that he has been our guardian, our protector, ever since we left New York there remaineth not the smallest doubt. To make you understand this preamble I must acquaint you of matters and things which we ourselves were ignorant of till this moment.

---

* With General Burgoyne.

‡ General Clinton's letter of Freehold in the Jerseys.

[The above notes are Downman's. The first refers to the action fought near Saratoga on October 7th, 1777. Lieutenant-General Burgoyne in his despatch from Albany, October 20th, after detailing his operations subsequent to crossing the Hudson River on September 14th, and in camp near Saratoga, the enemy being in the neighbourhood at Stillwater, describes that portion of the fight on the 7th in which the guns were lost, in the following terms :—

"The danger to which the lines were exposed becoming at this moment of the most serious nature, orders were given to Majors-General Philips and Reidesel to cover the retreat, while such troops as were not ready for the purpose, returned for the defence of them. The troops retreated hard pressed, but in good order. They were obliged to leave six pieces of cannon, all the horses having been killed, and most of the artillerymen, who had behaved as usual, with the utmost bravery, under the command of Major [Griffith] Williams, being either killed or wounded."

The second note refers to General Clinton's despatch dated New York, July 7th, 1778. In this he reports his sharp action with General Washington on June 28th, at Freehold Court House. No mention is made of the Artillery, though we know the brigades of Captains Williamson and Standish were among the troops chiefly engaged and which suffered heavy losses. Lieutenant Vaughan was killed.]

We sailed from New York on the 3rd of November with a fair wind and pleasant weather. On the 3rd of November also sailed from Boston the Comte d'Estaing with his whole fleet, both fleets bound to the West Indies and destined within a very few miles of each other. A remarkable interposition of Providence in our favour happened on the 17th of the same month, or thereabouts, when in or near latitude 26°. Commodore Hotham in the evening made the signal for the fleet to tack and stand to the eastward. This was done by the whole except a horse brig, which not paying attention to the Commodore, continued the course she was in and at daybreak in the morning was taken by d'Estaing's fleet. Had our Commodore been told, or by divination known that this formidable enemy was so near him, and had been desired to change or alter his course as he should think best, so as to avoid the danger, it is ten to one he had run directly into it, but as it was, being totally ignorant of the matter, he went Providentially the way that proved to be right. This I think, Master Alexander, was an almost hair-breadth escape, and our not falling in with this French Gentleman during the remainder of the passage was another instance of good fortune. Our arrival at this island in a happy moment of time; our landing instantly; our army being well posted; our fleet being even in the readiness they were; our finding ammunition on the batteries; the French cannon being so badly spiked; our repulsing the different attacks, though so very superior to us in numbers, and the very trifling loss we sustained by those attacks are matters I think that very fully evince what I have before mentioned, that we are assuredly the favourites of some good creature above. Had we been 12 hours later in our arrival, which might easily have happened; had we not landed directly—it was wonderful we did for it was just after dinner time—or had the Comte d'Estaing made his attack in a proper manner, and the instant he came to us, all had been lost.

We now continue the narrative from the diary.

December 19th.—We remained very quiet all last night. The French army was in the same situation they were yesterday. Their fleet is augmenting every day; there are now at anchor no less than twenty-six sail of ships of war and fifty sloops and schooners. One of our transports is taken; by some accident she drove out of our fleet. We have taken one of their vessels with a number of troops on board. The following letter from General Grant to Brigadier General Medows with General Medows' remarks was published to the troops to-day:—

"I cannot express how much I feel myself obliged to you and the troops under your command, in repulsing with so much spirited bravery so great a body of the enemy. I own it was just what I expected from you and them, and am convinced under your command they always will behave in such a manner as to do honour to you, themselves, their country, and their King, and I must beg of you to express my thanks and gratitude to them in the strongest manner."

" General Medows has the highest satisfaction in communicating so flattering a letter from the Commander-in-Chief to the troops under his command, and begs leave to mark to the officers and men his great admiration of their gallantry and good conduct in the affair of the 18th inst., he feels too much to be able to add more than that at the head of such troops he must be pleased to live and ready to die."

December 20th.—This morning very early we discovered to our right a body of the French seemingly going from the wood at the foot of the Morne Fortuné. We imagined they had been out during the night endeavouring to find an accessible road up to our head quarters, or to see if they could occupy the hills about the Cul de Sac where our shipping are. The force consisted of their marines and grenadiers and appeared to number about 800 men. They were sent by d'Estaing the day their army landed and had been poking about the woods ever since without being able to do anything against our posts. Last night and this whole day has passed without any popping from either side. Their army remains in the same position as before. They are very busy landing provisions, tents and other things, and are either mending the roads or are raising some kind of works on their eminences. We hear that on the 18th, Comte d'Estaing commanded the right, the Marquis de Bouillé the left, and Comte Lovendahl (who it is said was mortally wounded) the left of the French army. Their fleet is as quiet and inoffensive as lambs.

Every night and day that we have been on shore on this horrible island has been excessively windy and rainy, I never saw a part of the world a tenth so bad as this. The whole Island is a jumble of ragged mountains thrown upon one another with the utmost irregularity. Our troops go through inconceivable fatigue in transporting provisions etc. from the shipping.

December 21st.—Everybody quiet last night. Wind and rain as usual. I have now been seven days on shore, have not had my clothes once off, and have been wet through every day and night. The French army and fleet remain as usual. They landed a small body of men in a bay to leeward, with the intention, we imagine, of possessing themselves of the hills surrounding the Cul de Sac where our shipping are.

General Medows issued the following order to day :—

" Whenever the pickets are attacked the drums to beat to arms, and the lines to be manned immediately. As soon as our gallant and generous enemy are seen to advance in great numbers, the troops are to receive them with three huzzas, and then to be perfectly silent and obedient to their officers. Whilst they are cool by day and alert by night they have nothing to fear. If the enemy want our arms let them come and take them. During the attack some of the drums to assemble round the colours of the 5th Regiment and beat the grenadiers march."

December 22nd.—Quiet all last night. The enemy began yesterday to raise works on some hills in our front, and are going forward with them now. They are within reach of my guns, but I am not allowed to molest them. "It will not answer any purpose to prevent the enemy throwing up batteries and entrenchments," says our General. The *Ceres* sloop of war is taken by the French; she is now at anchor with their fleet.

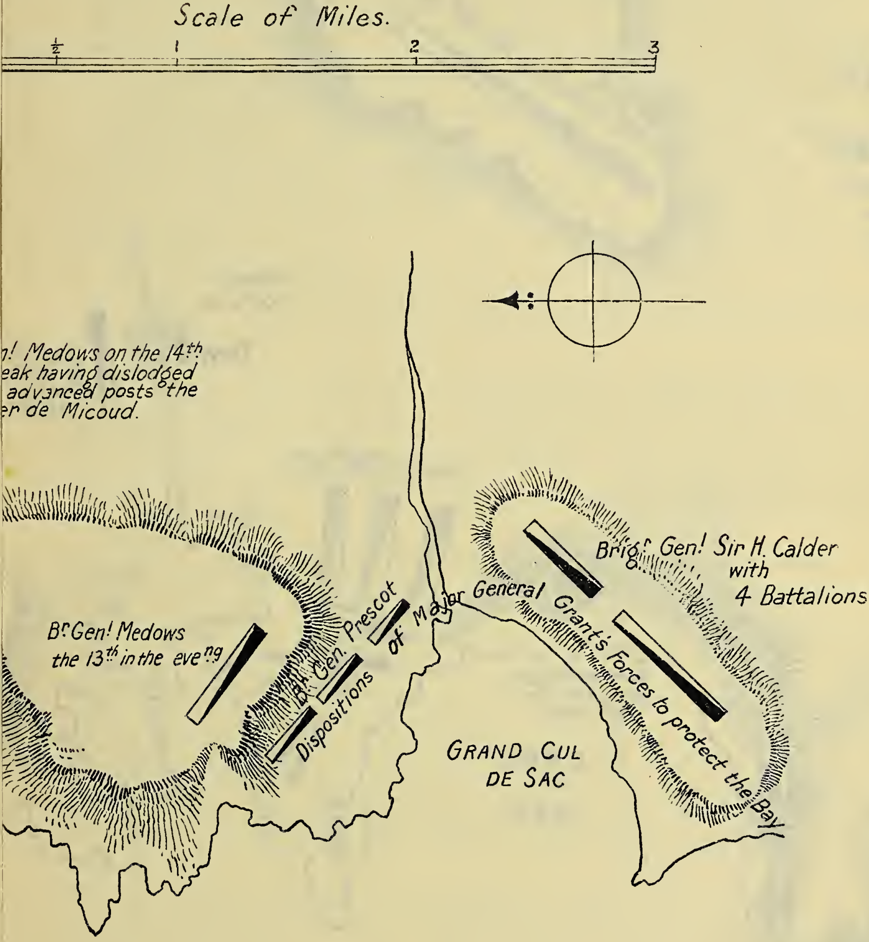
December 23rd.—All quiet last night. The French army and fleet in the same position as before. They seem very busy carrying on their works which appear to be made entirely for defence, for they are at too great a distance to do any mischief to us.

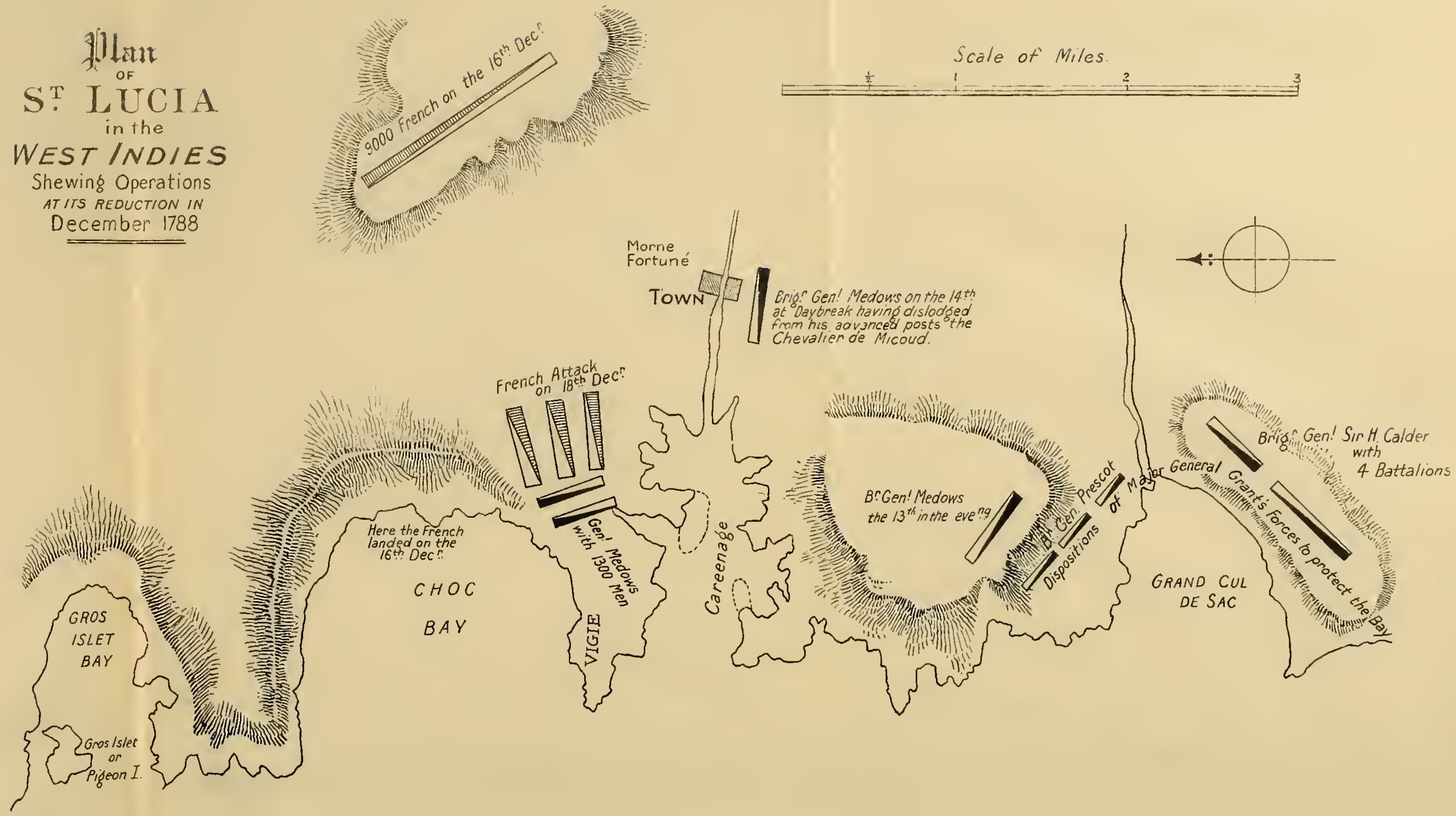
December 24th.—This morning early a rebel privateer carrying 18 gun and 130 men was taken. She came by mistake in the night to our fleet, and in her fright and confusion could not get out of reach of the shot from the ships and Garstin's battery before several had struck her. She is called the *Bunkers Hill.*

About 8 a.m., the French fleet began to get under way and continued till the whole was under sail standing to the northward. Their army is also in motion, retiring with their cannon, and making works as they move, which leads us to conjecture they have either learnt something of Byron, or are about to make an attack in a different manner from what they did before. In the afternoon the French fleet, after standing off and on, came to anchor about half a mile to windward of its former place, and in a more compact manner; their small craft remain as usual, except getting a little nearer to the shore.

December 25th.—This is the third day without rain and the weather has been very pleasant and cool. The hill I am situated upon commands a fine prospect both of sea and land, the eye never wants entertainment. Beneath us the French army carry on their works with ease and in perfect security, for we are polite enough not to molest them though much within the reach of our cannon. Their fleet is another entertaining object, it exhibits a fine and formidable appearance, and by their different signals and manœuvres amuse our sight, and make us form a thousand conjectures about their intentions. One moment we expect them to attack, the next we conclude they are going to leave us, but cannot believe they will be such cowardly rascals. The mountainous, rugged, irregular appearance of the island forms a very wild and savage picture, and the distant shore of Martinique adds a not unpleasing background to the whole. We only want Byron's fleet to make it a valuable and highly finished piece.

All this day the greatest part of the French fleet have their main and fore top-sail yards hoisted up which I think is a convincing proof they expect an enemy, and from everything we observe amongst them, their small craft and their army, we conclude that M. d'Estaing means


Scale of Miles.
½
1
2
3
n! Medows on the 14th
eak having dislodged
advanced posts the
er de Micoud.
Br. Gen! Medows
the 13th in the eveng
Br. Gen. Prescot
Dispositions of Major General Grant's Forces to protect the Bay
Brigr. Gen! Sir H. Calder
with
4 Battalions
GRAND CUL
DE SAC



Plan
of
St. Lucia
in the
West Indies
Shewing Operations
at its reduction in
December 1788

9000 French on the 16th Decr.
Scale of Miles.
½
1
2
3
Morne Fortuné
Town
Brigr. Genl. Medows on the 14th at Daybreak having dislodged from his advanced posts the Chevalier de Micoud.
French Attack on 18th Decr.
Genl. Medows with 1300 Men
Vigie
Here the French landed on the 16th Decr.
Choc Bay
Gros Islet Bay
Gros Islet or Pigeon I.
Careenage
Br. Genl. Medows the 13th in the eveng.
Br. Gen. Prescot
Dispositions of Major General Grant's Forces to protect the Bay
Brigr. Genl. Sir H. Calder with 4 Battalions
Grand Cul de Sac

to stay here till the arrival of our unfortunate hero, or to make his escape. If he has taken the former resolution, it in some measure accounts for his lamb-like behavour with respect to our little fleet, for should any of his ships get disabled, particularly in their masts, he would be quite unfit to risk an action with such a fleet as Byron's and Barrington's united. He would not only lose (most probably) a number of his large ships, but all his small craft, and thereby expose and leave open to us all the French islands, for these small vessels are the only transports they possess in this country. Let us even suppose while their present army (which by most accounts is 8,000 or 9,000 men) remains in this island, we should be unable to conquer them, yet if we beat their fleet we command at sea, and if occasion required our quitting the place for one of more consequence we might easily do it, and by the vigour of our naval force totally prevent their return to Martinique or any other island. From the movements of the French fleet and army it is natural enough to conclude that d'Estaing is either about to act a very spirited part, or the contrary, that is, that he means to fight Byron, or to run away on the first intimation he may receive of his being in these seas. I hope with all my soul he will stick to the former.

We are informed that Byron met with a gale of wind on the coast of America, that the *Somerset* was lost on Cape Sable and the *Bedford* dismasted.

December 26th.—The French army remain as usual hard at work in strengthening their situation as they retire. Their fleet remained at anchor all last night, but this morning got under way and are standing off and on, their small craft as before. In the evening the fleet again came to under the shore, but more to windward than before. A very rainy day.

December 27th.—Rained all last night. All hands very quiet. The French fleet remained as they were last night. This morning very thick and rainy. About nine o'clock the French fleet showed a number of signals and hoisted their colours, and four of their frigates are going leeward; they returned about noon. Their large boats are on shore and ranged along the beach as if to receive troops on board. Their small vessels have got nearer to the shore than usual, and their army have been making many movements, such as denote a re-embarkation or a resolution to maintain themselves on the heights opposite their shipping, to which they have moved several of their cannon and have made new works. This afternoon the wind blew fresh. Much rain.

December 28th.—Quite all last night, which was very windy with rain, this morning the same. The French fleet is in the same position. A part of their army either embarked during the night or is gone to some other quarter, as many tents are struck from the wood before us, and many of their flat bottomed boats or launches are ranged along the beach. This afternoon is very fine. The French army seem to get further from us, and it is believed they are preparing to re-embark their troops. The fires made by the French army this evening burnt for a little time very fiercely, but as the night advanced dwindled away.

December 29th.—As soon as the dawn of day appeared we found our conjectures respecting the embarkation of the French army to be true, not a French soldier to be seen on the shore, and all their small craft and boats are gone from the shore to the fleet which is still at anchor. What the intention of the French can be now, we must leave a few days to determine. I am much afraid they will return from whence they came and again give Byron the slip. If they are destined to any of our islands they still leave themselves exposed to our fleet, that is, if ever that unfortunate fleet should come to this country. At eight o'clock this morning a flag came from the Governor with terms of capitulation. Some light infantry from General Medows's post went and took ground on the hills in our front where the French were yesterday. At ten o'clock some of the enemy's ships of war got under way—also their small craft and are turning to windward under the lee of the island and others are standing over towards Martinique. About 12 o'clock the whole fleet were under sail and shaped their course for Martinique.—O Byron thou unfortunate dog! This is the third time thou hast lost a glorious, golden opportunity of immortalising thy name. They are gone, the birds are flown, therefore go and hang thyself; an unlucky planet reigned when thou wert born! Thou never will have in thy power such another moment to serve thy King and country.

The dastardly d'Estaing before he took his leave, told the Governor, M. de Micoud, he would wait in the harbour six hours after the troops were embarked, and told him to send to us directly and get the best terms he could. The Governor took his advice, for d'Estaing's boats had scarcely left the shore when the flag came in. We are well informed that the French did not lose less than 2,000 men during their stay on shore, and a very great number of them by cannon shot. The battery I had the honor to command on the attack of the 18th, did great execution. I received the thanks of Generals Grant and Medows, the latter called me his best ally. I had a fine situation for galling the French army as they marched to the attack in columns, I had them then charmingly, and while forming, and after being formed, and also in their retreat. I kept up as heavy a fire as I could on their flank which was presented to me the greatest part of the action. My shot in this situation swept them off by the dozens at a time, and Frenchmen's heads and legs were as plenty and much cheaper than sheep's heads and trotters in Scotland. Three of my guns were cracked during the action, one of them is rendered totally unservicable, the others will do at a pinch.

It is now evening. That poltroon d'Estaing and his fleet are totally out of sight, they are all safe in the harbour of Fort Royal. What a despicable figure has he made of himself! He attacked us the day after our arrival before we were prepared to receive him and reckoning the weight of his guns and ours, he had more than double our ships, and many of our transports were not got quite out of the way when the action began. Twice the same day did each ship of this formidable fleet (to look at) thunder their broadsides on our brave little squadron, but what was the result of this seemingly destructive fire? Not more than three or four men killed and ten or twelve wounded, and no damage done to any of our ships. It is astonishing, but it is no less a fact. The loss of the French we are quite ignorant about, we only know that several of their ships received damage in their rigging and that d'Estaing's nephew was killed by a shot from one of our batteries. The battery commanded by Lieutenant Garstin did much service to the English fleet by keeping the French at a distance; his guns damaged several of their ships. Admiral Barrington and General Grant gave him thanks for his behaviour that day.

December 30th.—The capitulation was signed.

December 31st.—An officer and thirty-five poor looking wretches of French soldiers marched into the town with a drum and laid down their arms at the bridge.

January 1st, 1779.—A ship of ours went with French officers and men to Martinique to be exchanged. From this day to the 5th nothing happened. Our fleet lay as usual, and our army are busy in making and mending roads. The French people are getting into the town and opening a few miserable shops. The situation of the town is horrible, it is in a bottom and almost surrounded with stagnant water. The inhabitants look more like bodies just crept from the grave to frighten one, than living creatures. The mulattoes and negroes are much better looking folks. The island produces the same articles as others of the West Indies, but the coffee and chocolate seem to be the principal care of the planters near this place. There are good fish to be caught with the hook and line in deep water along the shore, and up the harbours are abundance of mullet, but the rockiness of the coast prevents their being caught with nets except in a very few places.

On Wednesday, January 6th, about seven o'clock in the morning, we saw with great joy several large ships coming round the northward of the island towards us. We soon discovered them to be friends, and that they were no other than the fleet of our long lost, unfortunate Byron, consisting of nine line of battle ships only (including his own the *Princess Royal* of 90); several frigates and small craft were with him. He did not stop at Barbadoes, and had been only three weeks from Rhode Island.

When I give myself time to think seriously of the great force the French have in these seas, particularly the armament we have driven away, and the many hair-breadth escapes our little army and navy have had, I cannot help exclaiming, we are a most fortunate people! The Comte d'Estaing with his tremendous fleet sailed from Boston the same day, or near it, that we sailed from Sandy Hook. The narrow escape we had on the passage almost assures us we are the favourites of the Supreme Being, and that the cause we are fighting for is just and good.

We are well informed that on the night of the 17th November when we were in latitude 26°, or thereabouts, the Comte d'Estaing was within a very few leagues of us. Our Commodore made a tack that night and stood to the N.E. One of our vessels, a brig with horses, did not attend to the signals, and kept her course, finding herself at daybreak in the midst of d'Estaing's fleet. This was a providential escape, and our not falling in with him during the whole passage was equally fortunate. The two commanders had not the smallest idea of one another's situation. Our arrival here at a happy moment of time, for had we been twelve hours later all had been lost—our landing instantly, our being well posted, our fleet being even in the readiness they were, our finding the French cannon so badly spiked and having them ready to make use of just by the time the French arrived, our finding ammunition, our repulsing their different attacks though so very superior in number to us, and the very trifling loss we sustained in those attacks are I think circumstances that very sufficiently evince we have a good angel attending upon us.

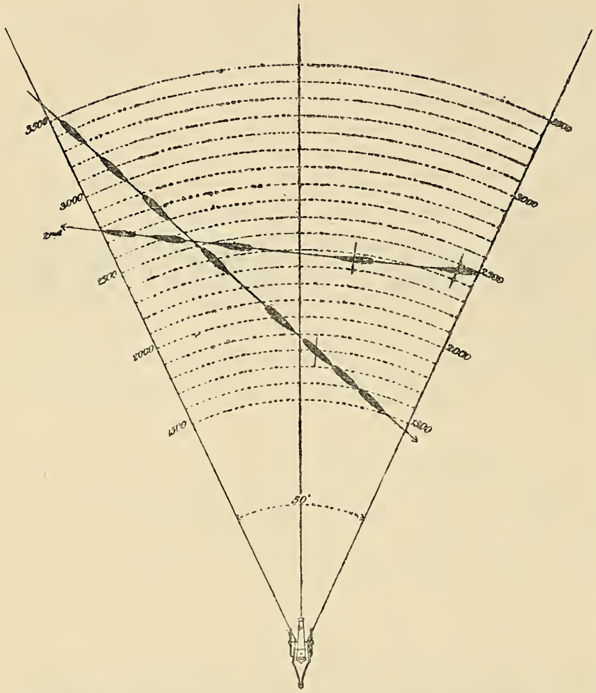
(To be continued.)

MORRIS' TUBE PRACTICE.

— BY —

LIEUTENANT G. C. STURROCK, R.A.

The following account of Morris' Tube Practice may be of interest. The company to which I belong, No. 5 Company, S.D.R.A., had not for the past eight years been in a coast defence station, and therefore the great majority of the men knew comparatively little of coast defence work. In the early part of 1897 we were told that we should do our practice, including the competitive, at Bombay with 6″ B.L., at coast defence targets. It was, therefore, necessary to give the N.C.O.'s and layers some idea of the work they would have to do, i.e., duties of gun layers and gun captain. We made many attempts to do this with our armament; 64-pr. converted guns on wooden sliding carriages, taking "ekkas," bullock carts, etc., moving across a bridge of boats about 1,000 yards from the fort as laying points, but with a very limited amount of success; the guns and mountings being unsuitable and not fitted for Case II. I was then allowed to work out a system of Morris' tube practice and after some two months the following finally evolved itself. A flat portion of the parade ground was chosen, with a wall at one end of it; at the other end a 40-pr. fitted with a ·220 Morris' tube was placed on a platform. From a point under the trunnions at a scale of 10 ft. to 1″ (R.F. $\frac{1}{120}$) distances of 1,500, 1,600, etc. up to 3,500 yds. were marked out straight to the front. A cardboard reader was then fixed to the carriage by the elevating arc on which a long paper strip was fixed. The gun was then laid Case I on the different ranges and the paper strip graduated for every 200 yards up to 2,500, and thence for every 500 yards, and from this was filled in by interpolation.



A paper straight-edge sight was fixed on the French's sight of the gun (to allow of sufficient deflection being obtainable). The range strip was checked by several rounds being fired by Case II down the marked straight line in front. Then curves of range (*vide* diagram) were marked out on the ground by trial shots, and these were filled in with chalk. An arc of about 50° was obtained for the fire area. The G.G.C. performed the duties of B.C. and range finder by means of the arcs on the ground. It was found necessary to mount on a limber and use field glasses for observation purposes, although the longest range was under 30 yards. Ranging was carried on in the ordinary way, and was very necessary as the gun, after being traversed two or three times, would run up eight or nine inches (25 yards) and the paper range strip had an awkward habit of shrinking. The latter was got over by putting on a new duplicate strip on the old marks, daily, before firing, but the fitting is rarely so accurate as not to necessitate some slight correction; never, however, more than would be a probable variation of gun range.

The detail required was :—

One G.G.C.
One Detachment consisting of G.C., G.L., and
  four other numbers.
One target man.
Two safety sentries.

The detachment was told off in the ordinary way, their general duties being as follows :—

G.C. *vide* G.A. drill.
G.L. ,, ,, ,,
2 and 3 traverses, runs up or back, if required.
4 elevates and fires.
5 attends to tube and loads.

The layer stands on the end of the trail and leans on a handspike fixed in the trail.

The target No. towed the target by means of a long string, taking if necessary a lead round a picket or tent peg. In order to interest the men, the targets used were paper models (fitted on a flat board), usually of torpedo boats, but we also had models of the *Terrible,* a second class Japanese cruiser at present building.

The torpedo boats were very rough models, about six to ten inches long, and were patched up daily with stamp paper. The other models were more highly finished and stood punishment remarkably well. The Japanese cruiser had some 250 hits or more and was still serviceable as a record target when discarded, although only one gun and one mast had survived.

As to accuracy the following speaks for itself :—

The target was the *Terrible,* speed twenty knots per hour, range varying from 3,500–1,500 yards, eight rounds and seven hits (main length with line of fire 35°), the hits being all within a space of 10″ along the side of the ship (or 100′). All of them were far aft, and a very slight difference in time of firing made a difference of 5″ or 6″ along the side of the ship. The second run on that day was across the front from 2,400–2,800 yards, five rounds and four hits, one being a ricochet. These were closer together, the first two being 2″ and 3″ aft of the forward mast, and the next two hits with altered deflection being both within 3″ of the bow. The third round was short as when altering the deflection to bring the shot forward the range was not increased proportionately,

The best practice made was :—

Range between 2,400 and 2,500 yards.
Target 70′ long (7″).
„ 10′ beam (1″).
„ 4′ height above waterline (4).
Speed about twenty-seven knots.
Main angle with line of fire about 90°.
Result seven rounds and five hits.

The easiest target is one approaching or receding directly to or from the gun. The hardest a target with small freeboard and beam, at a constant or very slowly varying range.

A longer range could not be used owing to the smallness of the graduations on the range strip The speed is very hard to manage. If slower than twenty knots or thereabouts the target sticks and jumps forward forty or fifty yards at a time. The targets were all modelled to scale (R.F. $\frac{1}{120}$) in paper, as accurately as could be done from published dimensions.

One advantage of these targets is that in place of the laying parade being exceedingly uninteresting and tiring it was no uncommon sight to see practically the whole battery watching, and the layers themselves asked permission to have the gun out to practice by themselves at it.

PRACTICE AT MODEL OF "TERRIBLE."

The position of the ship is shewn at each round on the diagram.

Range on Gun.		Actual range bow waterline.	Remarks. Deflection 10.
1	3500	3325	Hit. 15 feet up, 80″ from stern, came out on waterline about 20 feet from stern.
2	3300	3025	Over. Looked like a hit from battery.
3	3000	2725	Struck after bridge, then breech of after 9·2″ gun and destroyed latter.
4	2500	2325	Hit. About 12 feet in front of aft 6″ casemate 4 feet up. Ricocheted inside, came out grazing after mast and cutting up through conning tower.
5	2200	2025	Hit. Passed between muzzles of aft 6″ (both trained aft) and out on opposite side about 80′ from stern.
6	2000	1825	Hit. A little further aft on near side and forward on far side. Waterline on far side.
7	1750	1600	Ditto. Waterline on far side.
8	1650	1525	Ditto. Ricocheted inside, came out high up.
			2ND RUN. Deflection 30 Right.
1	2400	2375	Hit. About 4 feet up aft of forward 6″. Ricocheted up through deck.
2	2400	2400	Ricochet hit about 12 yards short, close by first round.
3	2500	2550	Short about 70 yards, ricocheted over. Changed deflection from 30 R to 20 R.
4	2750	2650	Hit, glancing on deck, ripping deck for about 20 feet.
5	2850	2800	Hit. Entered part of forward 12-pr. disabling and dismounting, came out on waterline.

THE DEVELOPMENT OF ARMOUR DURING THE YEARS 1893-98.

BY

CAPTAIN C. ORDE BROWNE, *late* R.A.

Continued from No. 9, page 483.

***Masscahusetts* Turret Target, 1896.**

During May and June, 1896, the United States Naval Department fired at a target resembling as far as possible the *Massachusetts* turret 10 ft. 10½ in. in height inside, and 27 ft. 3 in. inside diameter. The structure carried one Harveyed nickel plate 15 in. thick and ten 15 in. cast iron plates. The weight of the guns and mounts was represented by pig iron. The whole weighed 450 tons. The following rounds were fired :—

Round.	Projectile.		Striking Velocity. Foot-Seconds.	Striking Energy Foot-Tons.	Energy per Ton of Turret.
	Nature.	Weight in lbs.			
I.	Wheeler Sterling 10-inch.	500	1683	9,829	21·84
II.	Wheeler Sterling 12-inch.	850	1701	17,069	37·95
III.	Johnson Capped 12-inch.	850	2000	23,626	52·5

The first two shots broke with penetrations of 9½ and 11½ inches respectively. The third perforated but broke up, wrecking the rear part of the turret which, however was not deformed. The turret moved 9¼ in. on the rollers, but these were not flanged as on board ship, so it is thought that an actual turret on board ship would have held its ground.

It has been seen at Shoeburyness and other trial grounds that hard faced steel and even compound shields spring in the ground much more than those of wrought iron. This matter is therefore important, and as the subject for investigation was the movement of the turret,[1] it is to be regretted that in so costly an experiment, the slight additional expense of using flanged wheels should have been spared, seeing that this would have afforded certainty in place of conjecture however probable. It is difficult to convert the blow of a shot into movement of a large mass, but when once the mass is in sudden motion, it seems rather guess work to say what will stop it.

---

[1] It is interesting to compare this with the Glatton Turret trial in which the wall bent under the blow of a 12-inch shot.

Cammell 6-in. plate, 1897.

On September 22nd, 1896, a Harveyed nickel steel plate made by Messrs. Cammell was subjected to the new test of fire 6 in. Holtzer shot delivered with 1,960 f.s. striking velocity and 2,665 ft.-tons energy and 13·45 perforation of iron establishing a figure of merit, 2·24, which is very good. The back showed slight bulges with openings commencing in the centre. In March a Brown's plate behaved very similarly and a Vicker's plate made by the Krupp process as worked out by Vickers was tested with admirable results in March, 1897 (see Figs. 16 and 17). At the request of the makers a

Vickers 6-inch plate, 1897.

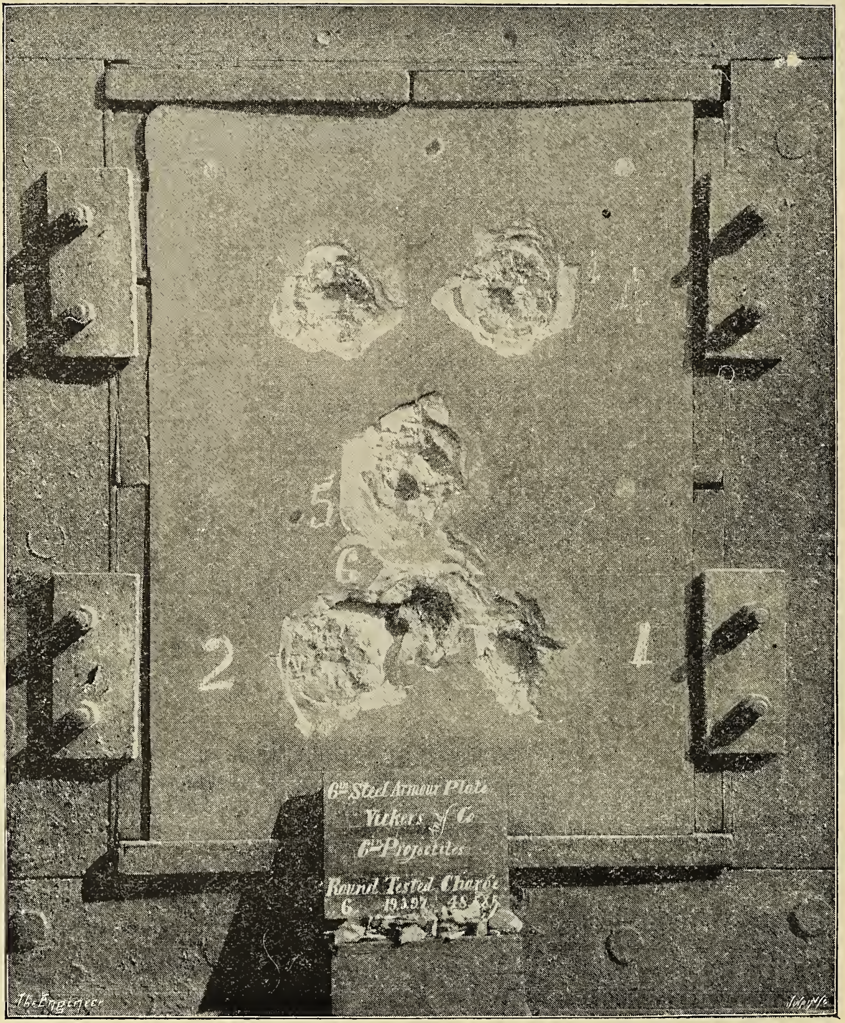


Fig. 16.

sixth round was fired. It may be seen that the bulging is slight and the cracking insignificant.

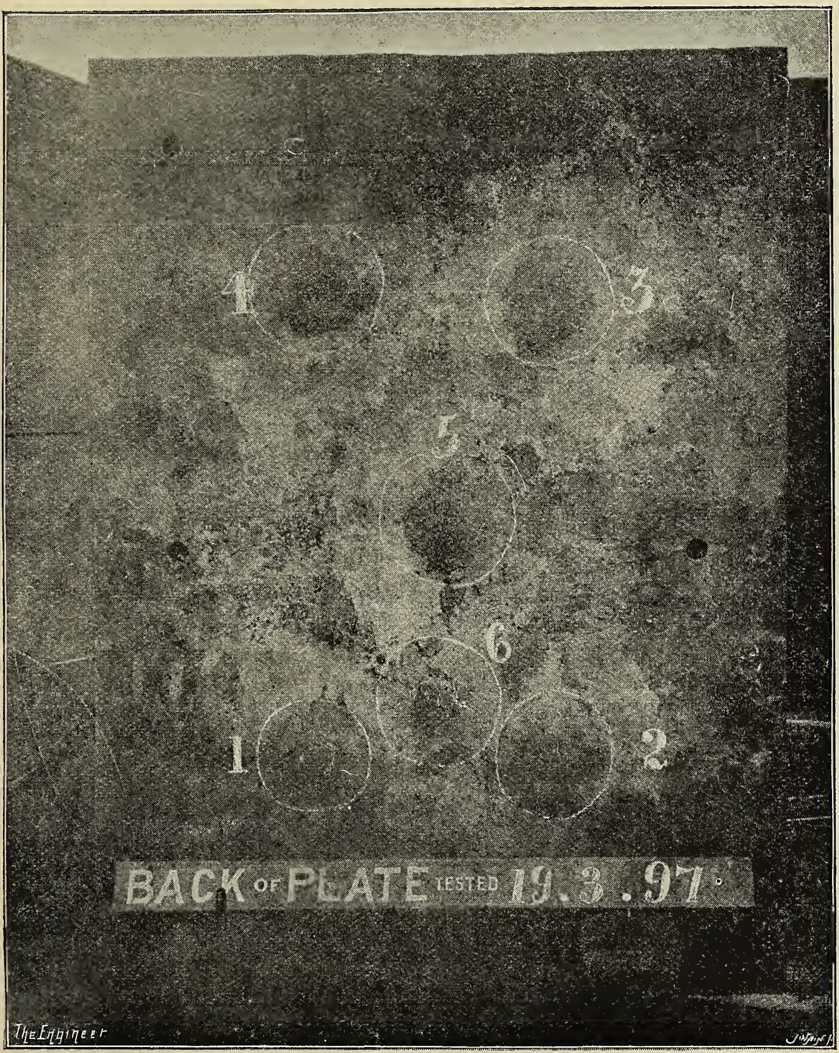


Fig. 17.

Vickers $11\frac{11}{16}$-inch. plate, 1897

Fig 18 shows a plate $11\frac{11}{16}$ in. thick manufactured by the Krupp process in the form in which it is worked by Messrs. Vickers which may challenge comparison with any thick armour yet tested. The dimensions of the plate were 10 ft. × 7 ft. × $11\frac{11}{16}$ in. Three Holtzer 12-in. projectiles weighing $721\frac{1}{2}$, 714, and 715 lbs. struck it with velocities of 1860, 1868 and 1860 f.s. respectively implying a perforation through iron of about 23·5 in. thus establishing a figure of merit of

2·05. The striking energy of each blow was very great, the average being 1,146 ft.-tons per ton of plate and the shot being more than $\frac{1}{7}$th the

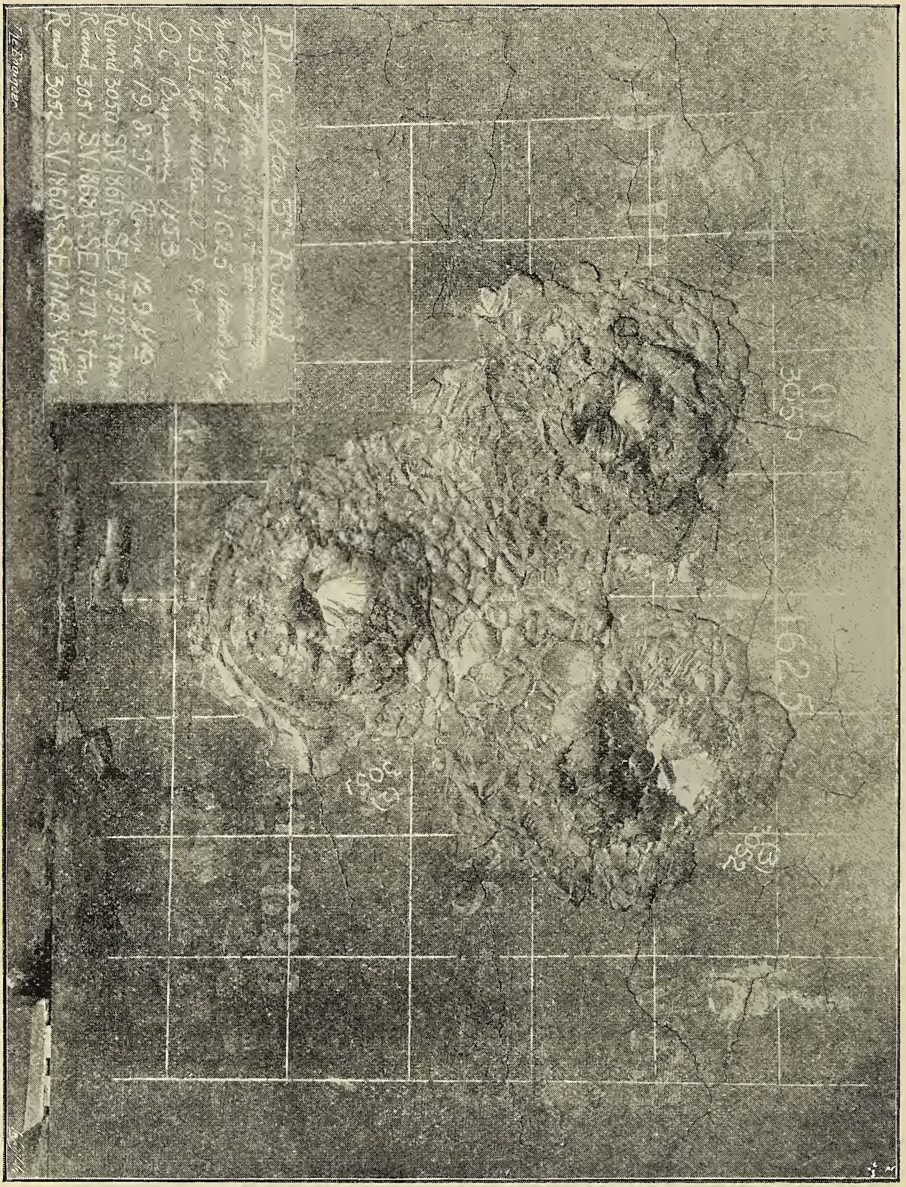


Fig. 18.

U.S. Armour. *Kearsage* plate.

width of the plate the wedging strain was enormous.

The following test of armour for the Kearsage in the United States (see Fig. 19) is probably a good example of what could be done there.

The plate was a Bethlehem one, 10 in. thick, and was attacked in the spring of 1897 by 8-in. Holtzer shot weighing 250 lbs., with striking velocities of 1,474, 1,754, and 2,079 ft.-secs., the striking energy of the last round being 7,494 ft.-tons. These velocities imply perforations through iron of 12, 15·6 and 20·1 in., the last being 2·01 times the thickness of the plate. The penetrations effected were estimated at 2, 4, and 10 in. The plate is apparently excellent, but the severity of the trial cannot be compared with that of the Vickers $11\frac{1}{16}$-in. plate because although the perforation test by the last round is nearly the same, the two first, which, it appears, would have secured the acceptance of the plate, were much lighter blows, whereas Vickers plate received three similarly heavy blows. The American 10-in. plate was attacked by an 8-in. shot, and the Vickers $11\frac{1}{16}$ in. by a 12-in shot. Without being able to give the exact weight of the plate, it may be seen from the scale in the figure that its dimensions were about 12 ft. × 6ft. 6 in., so its weight would be about 14·3 tons, and the shock per ton of the heaviest blow only about 524 ft.-tons as compared with 1,169 ft.-tons in the British plate. Then again, the penetration actually achieved was much greater in the American plate. Lastly, the scale of operations is smaller, which favours the plate generally. Altogether, remarkable as the achievements of U.S. armour have been, there has been nothing in thick Harveyed

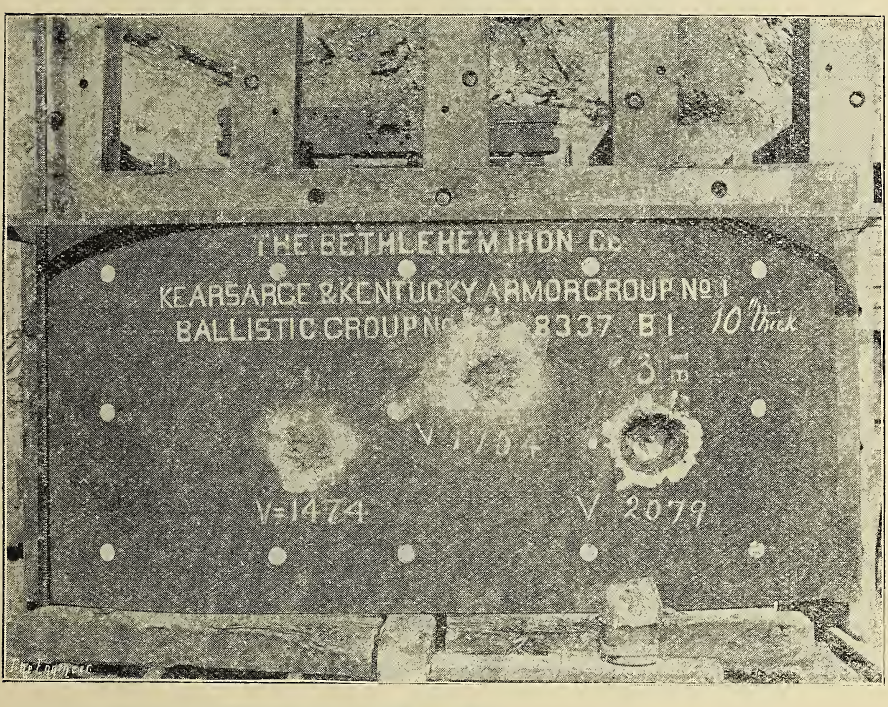

THE BETHLEHEM IRON Co
KEARSARGE & KENTUCKY ARMOR GROUP No 1
BALLISTIC GROUP No 2 8337 B1 10" thick
3 in
V 1754
V=1474
V 2079

Fig. 19.

armour to compare with thick plates made in England and Germany on the Krupp process. The latter are certainly test plates, not plates taken on supply, but making all allowance for this, the advance in resisting power is very great.

Witkowitz homogeneous steel armour.

Attention was called by an article in the *Mittheilungen aus dem Gebiete des Seewesens, No. II.*, 1897, to the behaviour of a Witkowitz homogeneous steel plate, and also Harveyed Witkowitz armour. The principal interest attaches to the former because a Witkowitz plate of this nature was preferred to all others with hardened faces in a competion at Pola in 1893, and but little has been published showing the development and powers of this special make of armour. Two plates were attacked, one Harveyed and one of homogeneous nickel steel, in September, 1896. The early date detracts from the value of the trial, but the advocacy of the armour as compared with that of Krupp's on the strength of it, is comparatively recent, and it is the best comparison of the best homogeneous armour available at the present time, so that a few words on it seem to be desirable. The harveyed plate No. 6,402, was, 6·07 ft. × 4·84 ft. × 8·66-in., and probably weighed 4·66 tons. The attack is shown in the following table :—

Attack of Plate No. 6,402.

No. of Round.	Weight of Projectile in		Striking Velocity in		Striking Energy in Foot-Tons.	Energy per Ton of Plate in Foot-Tons.	Perforation through Iron by Tresidder Formula in Inches.	Relation of Calculated Perforation to thickness of Plate.	Depth of Indent in Inches.
	Kg.	Lb.	Metre-Seconds.	Foot-Seconds.					
I.	45·6	100·5	602·3	1976	2720	611·6	13.8	1·59	3·6
II.	45·7	100·8	639·4	2048	3075	660·3	14·4	1·66	3·9
III.	45·5	100·3	673·15	2208	3388	727·4	16·2	1·87	2·0

This attack was defeated with some face scaling but slight bulges and no cracks (see Fig 20).

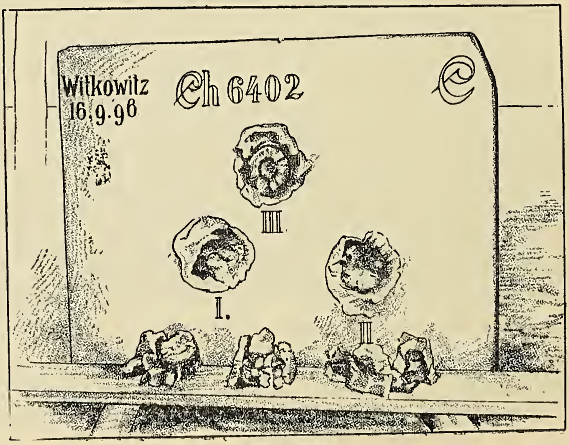


Fig. 20.

The homogeneous steel plate No., 6,559, measured 5·64 ft. × 5·64 ft. × 8·66 in., and probably weighed about 5 tons.

Its attack is shown in the following table:—

ATTACK ON PLATE No. 6,559.

No of Round.	Weight of Projectile in		Strikiug Velocity in		Striking Energy in Foot-Tons.	Energy per ton of Plate in Foot-Tons.	Perforation through Iron by Tresidder Formula in Inches.	Relation of Calculated Perforation to thickness of Plate.	Depth of Indent in Inches.
	Kg.	Lb.	Metre-Seconds.	Foot-Seconds.					
I.	45·5	100·3	608·4	1996	2771	549·1	14·0	1·62	4·9
II.	45·7	100·8	638·9	2096	3070	608·2	15·0	1·78	5.3
III.	45·5	100·3	677·3	2222	3434	680·5	16·4	1·89	4·3
IV.	45·55	100·4	677·3	2222	3438	681·3	16·4	1·89	5·3

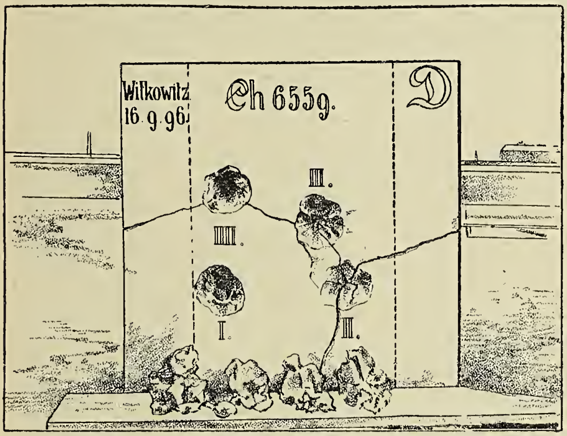


Fig. 21.

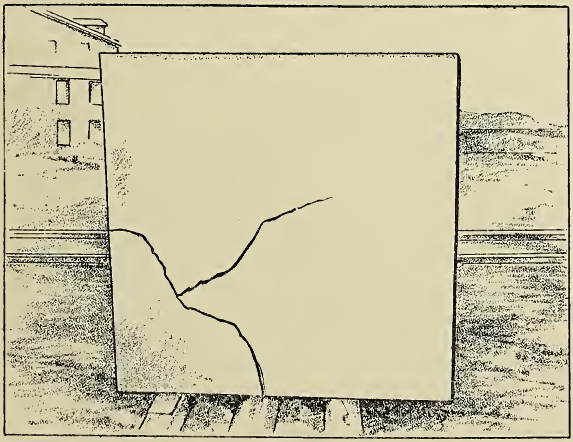


Fig. 22.

The first two rounds produced no bulges or cracks. The third struck nearer to the second than was intended, and horizontal and vertical through cracks were made to the plate edge, apparently starting from round II (see Fig. 21). A fourth round further developed the cracks, but no bulges were made (see Fig. 22).

The plates were good, but the attack is not severe. The gun employed was only a 15-c.m. (5·9-in.) piece, which is small for a plate 8·66 in. thick. The homogeneous plate had a great deal of bone and stiff resistance in it, but judging from the way the cracks appear to start from the second point of impact, the metal was becoming strained and disintegrated at an early stage, and British plates very shortly after this date were called upon to bear a much more severe strain for acceptance. In short this trial is mainly valuable as showing that Messrs. Witkowitz, in spite of earlier successes, cannot make homogeneous plates to compare well with their own Harveyed plates of the same date, and such plates admit of no comparison with the hard-faced plates of Krupp or other makers.

British test for 4-inch plates.

Cammell 4-in. plate.

Fig 23 herewith shows a Cammell 4-in. plate, 4 ft. × 4 ft., of about

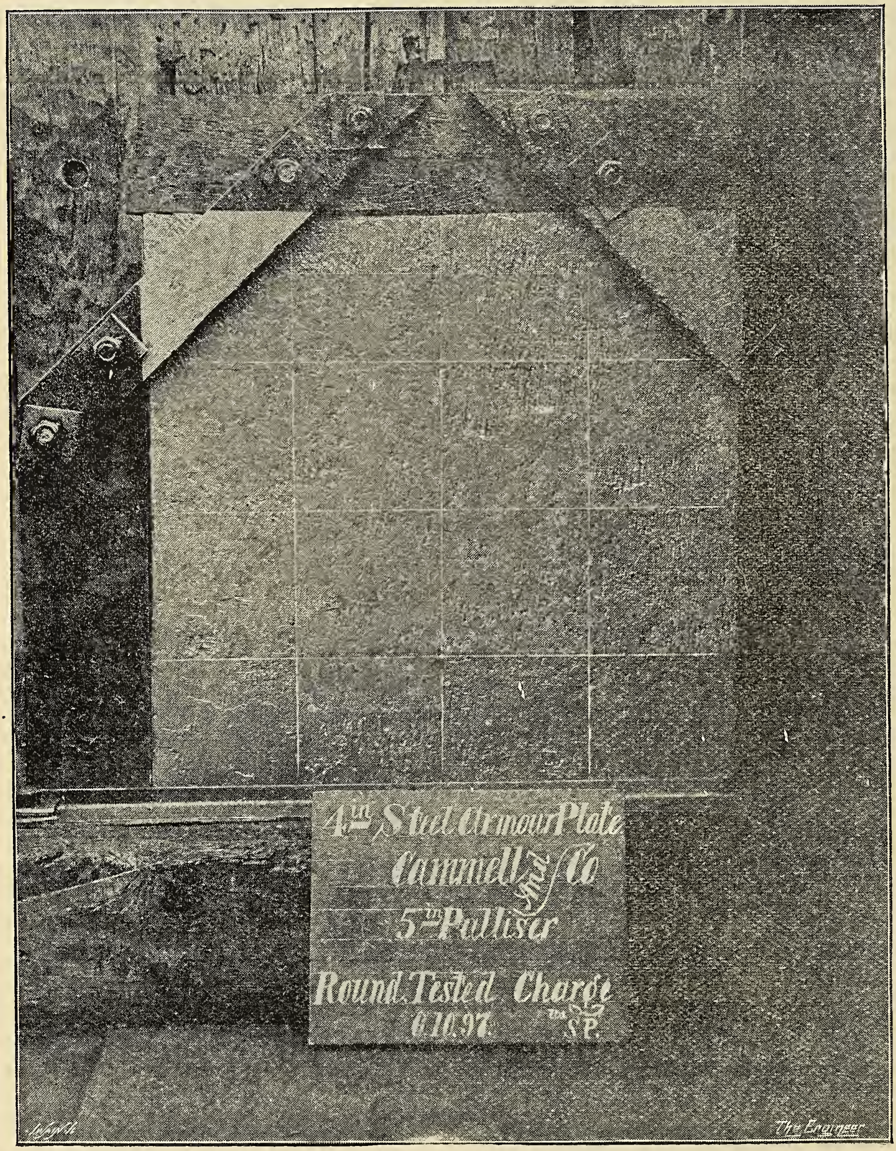


Fig. 23.

one ton weight, after being subjected to the service test on supply—that is, an attack by three Palliser 5-in. projectiles each weighing 50 lbs., with striking velocities of 1,406, 1,750, and 1.750 ft.-secs. The calculated perforation of each of the last two rounds is 8·8 in. of iron, and the shock per ton about 905·3 ft.-tons. The shot are, on one hand, brittle, but, on the other, of calibre exceeding the thickness of the plate. On the whole the test is much less severe than that to which 6-in. plates are subjected, and it may be seen that the plate, which is apparently a very good one, is scarcely bruised by it.

Vickers Plate.

In July Messrs Vickers had a most successful trial of a 4-in. special nickel plate on the *Nettle*. The test and the defeat of the projectiles was the same, and the results nearly the same, as shown above in the case of the Cammell plate.

Messrs. Brown's experiment

Messrs. Brown made an important trial as to the behaviour of a rough worked face and the effect of "lap," or fold, on a face struck by shot. A 6-in. plate was machined on one face and divided, one half subsequently having the machined face treated, and the other the rough face, across which was a lap. Both resisted the usual attack of five 6-inch projectiles, striking with a velocity of 1,960 ft.-secs., without serious cracking. It appeared, however, that one shot, striking exactly on the lap, got more nearly through than any of the others on either plate, including one striking a spot one inch from the lap; consequently this trial seems to indicate that machining is waste of work, and that a lap produces no effect unless the shot strikes exactly on it.

Carnegie Krupp armour.

The photographs herewith show results of a trial of an experimental plate made on Krupp's process. The special points of interest are, first, that Krupp's process should be adopted in the very home of the Harvey process; secondly, the severity of the test; and thirdly, the comparative action of ordinary uncapped and of capped shots.

The trial took place on July 13th last at Indianhead by the United

No. of round.	Striking velocity.	Striking energy,	Calculated perforation through iron by Tresidder's formula.	Relation of calculated perforation to thickness of plate.	Results.
	Ft.-sec.	Ft.-tons	Inches.		
1	2021	2832	14·1	2·35	Projectile smashed with about 2·5-in penetration.
2	2237	3470	16·3	2·72	,, ,, with 5-in. estimated penetration.
3	2350	3830	17·7	2·95	Perforated, but remained in backing and broke up.
4 (capped)	1984	2730	13·9	2·31	Perforated plate and backing and broke up.

States naval authorities. The plate measured 9 ft. by 5 ft. 8 in. by 6 in. It was backed by 12 in. of oak and two $\frac{5}{8}$ in. skin plates held up by ten bolts. The plate face was hardened to a depth of from 1·5 in to 2 in. The attack was made with a 6-in. gun firing Carpenter steel projectiles, weighing 100 lb. each. The positions of impact on the plate are shown in Fig. 24. The data of the four rounds fired are shown in the table on page 517:—

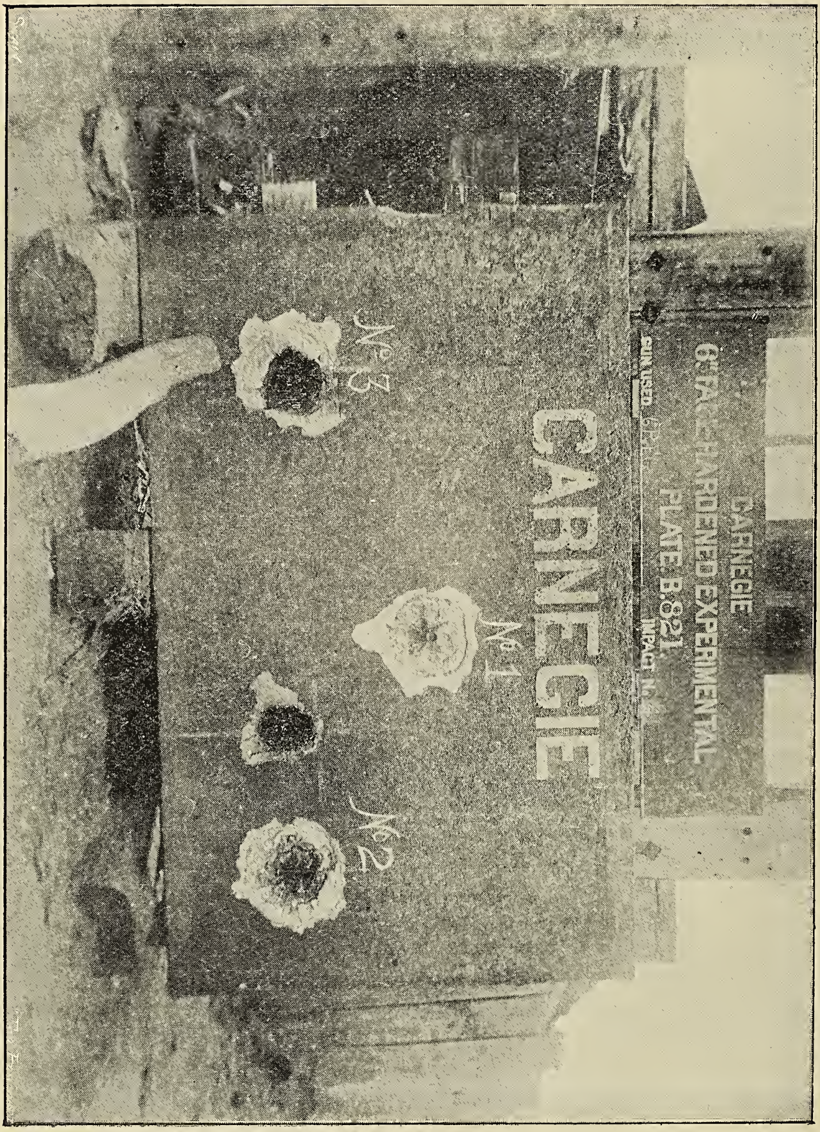


Fig. 24.

The effects of the rounds may be fairly seen by the photographs—Figs. 24 and 25. The first round near the centre caused a dish in the face round the point of impact about $\frac{7}{16}$ in. deep; the shot spread to a diameter of about 12 in. A bulge 1·5 in. long was formed at the back, but no cracks were effected, nor was any injury done to bolts or structure. The projectile, which was hardened to 3 in. below the bourrelet, was not broken up small, one fragment containing a large portion of it.

The second shot struck near the right-hand bottom corner. The projectile, which was hardened to about 2·5 in. below the bourrelet, broke up, a great part remaining welded in the plate. A bulge 4·5 in. high was formed on the back of the plate. The front was dished about $\frac{1}{3}$ in. round the point of impact. The face flaked off to the extent shown in Fig. 24. There was no injury done to the structure and bolts, and the plate was not cracked.

The third round was fired with a charge of 25 lb. of California S.P. perforated cylinder powder. It was the hardest blow delivered in the trial. The shot was hardened to $2\frac{3}{4}$ in. below the bourrelet. It struck near the left-hand bottom corner—see Fig. 24—and perforated the plate and broke up, carrying all its fragments into the backing where they remained, being stopped by the skin. The hole in the plate was oval, its greatest diameter being 8·5 in. The effect was a punching one, the projectile driving the disc of plate in front of it. The flaking of the face is shown in Fig. 24. The plate was not cracked, nor were bolts or structure injured. The fourth round was fired with a Carpenter projectile capped, thus weighing 104 lb. The projectile was hardened to 4 in. below the bourrelet. It struck low down to the right of the centre line—see Fig. 24. It perforated the plate, backing, and skin, and broke up, barely entering the sand butt in rear. The hole was oblong to a less extent than in the previous round, the greatest diameter being 6·75 in. There was no dish in front, and but little flaking. The plate was not cracked, and bolts and structure were not injured.

The plate was naturally held to have shown remarkable powers of resistance. Its appearance was good both in face and back.

Certain features in this trial are of special interest compared with our own trials. First, the plate was tested up to complete perforation. Round three, in which the shot stopped in the backing, is probably nearly the exact measure of the plate's powers of resistance, seeing that the plate kept out the previous round with only 113 foot-seconds less velocity. Probably, however, a shot with even considerable increase of velocity might effect no more practically, seeing that the shot broke up and perforated by punching, for it may readily be admitted that a great amount of energy would be necessary to drive fragments and disc through the skin.

That perforation should eventually be only achieved by punching is extremely interesting, showing the behaviour of the face in defeating the entrance of the sharp point. The dishing of the face round the point of impact in this and the previous rounds seems to show how much toughness was called into action. The factor of this plate is enormous, namely, 2·95. This was a little beyond the actual factor of the plate's power of resistance, but that of the previous round, namely,

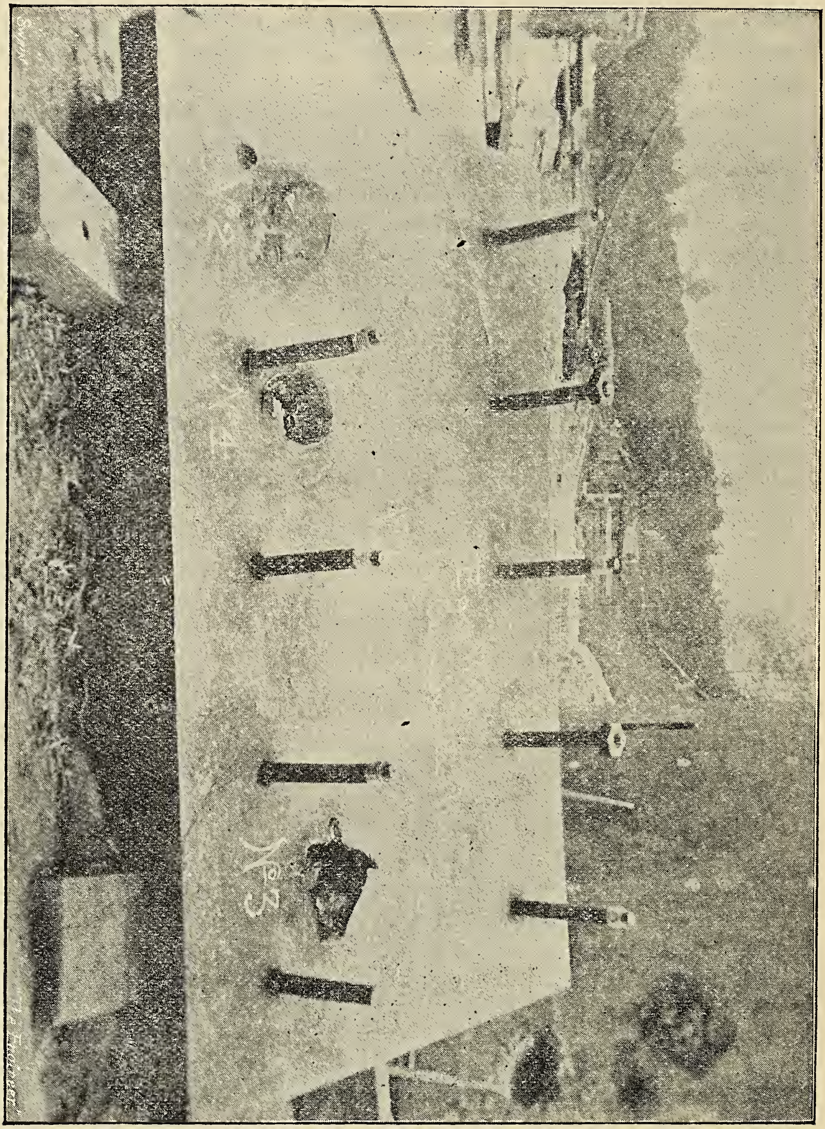


Fig. 25.

2·72, is very great, larger than hitherto met with. Very probably, our own excellent Sheffield Krupp plates would give just as good a factor, but they have not ever thus been tested, and we see the value of the test being pushed thus far in exhibiting the manner in which the plate yields. Then, the behaviour of the capped shot is of the highest interest. The cap apparently enabled the shot so far to retain its point as to perform its boring action through the plate, and by this means to get through plate and skin, although breaking up, thus defeating the plate with a velocity of only 1,984 foot-seconds, and a figure of merit or factor of only 2·31. Something of this kind most likely happened, although the action must have been imperfect. It is desirable to know if the plate had been broken radially from the centre or point of impact of the shot's point, or driven out in a disc. Fig. 25 shows the piece of plate broken away. The report speaks of what is termed a "spur" at the point of exit about 1·6 in. high. The trial must go to establish the excellence of Krupp plates, and, further, the value of the cap on the shot point.

It is to be noted that while this Krupp plate exhibited the usual characteristic toughness, it is again seen how mild a tax is imposed on thin plates in the way of fracture. The energy per ton of round No. 3 is only 506 foot-tons supposing the plate to weigh about 5·6 tons. Nevertheless the setting up of the shot produced a wedge of considerable diameter, which the plate's own resisting power thus brought upon it, but which it bore admirably.

(To be Continued.)

Q.F. FIELD ARTILLERY FIRE.

BY

LIEUTENANT C. H. WOOD, R.H.A.

THERE is a story, which we have most of us read, of a certain king who, when his harvest was ready to gather, used to order out his artillery, blow all the heads of corn from their stalks and afterwards gather up what he was able to. The story goes on to relate how a fortune seeker, whose sole patrimony was a scythe, happened to pass that way, and in a very short time obtained the contract for cutting the crops throughout the entire country. The king was too go-ahead, he had overlooked such a simple device as a scythe. We are not told, by the way whether he employed his guns to till the land, perhaps he did. History repeats itself.

The 12-pr. B.L. has been the field gun for about eight years. With this gun was introduced a carriage having all the latest improvements, nave brakes, tyre brakes, buffers, traversing gear, etc., have all been tried in turn. It has taken eight long years to get rid of them, eight years of expense and failure. Is it all going to be thrown away? The Pendulum appears to have well started on the return swing and we are once more confronted with a gun in which there are to be all the modern improvements, though some of them seem to be remarkably like our old friends.

The latest gun and carriage the 12-pr. of 6-cwt. is the very acme of simplicity, and even that will not always stand fast going, over ground that is at all rough; how much less chance therefore is there of bringing a more complicated gun safely into action, not once only but throughout a campaign. A gun carriage may stand a lot of firing off the sea front at Shoeburyness, but it is rough ground that is the real test.

It is practically settled that a Q.F. gun will be the gun of the near future, everybody is agreed that on its adoption the safety of the British empire depends. There are one or two points however about Q.F. guns that might be worth noticing.

Let us imagine a battery of six Q.F. guns in action against any standing target, an opposing battery for instance. Leaving the ranging rounds out of account (roughly speaking it would take the same time to range with Q.F. guns as with the present ones), how many rounds of battery fire would it take to demoralise the opposing battery so that their fire would become harmless? Assuming the range and fuze to have been correctly found, six would appear to be an average estimate, and there would be very little difference in the time taken to fire those six rounds from Q.F. guns or the present guns. Fire at shorter intervals than ten seconds after that would only result in waste of ammunition.

Let us look at the other side of the picture; supposing our own battery is being rather severely handled, there would be an almost irresistible inclination to loose off rounds as quickly as possible regardless of whether they were effective or not. The fewer Officers and N.C.O.'s there were left the less control there would be over the fire and consequently the greater would be the waste of ammunition.

Take the case of a cavalry charge, a rare occurrence, but one in which the utmost rapidity of fire would seem to be desirable. Is it not generally allowed that cavalry would have but a poor chance against the present gun ? and if so why fire more rounds than can be fired from the present gun ; it would again appear to be a waste of ammunition.

The rate of fire at a moving target at medium and long ranges depends mostly on the setting of fuzes and the time taken to supply ammunition from the limber to the gun.

There is no doubt that a Q.F. gun would be an advantage to Horse Artillery when acting with cavalry if the target was not further off than 1,000 yards. But it must not be forgotten that in a very short time it is possible for a battery to be left with empty limbers, a serious matter in this case, and what is more important the carriage for the Horse Artillery gun must be of the simplest construction if it is to stand a campaign.

Another advantage of the Q.F. gun is that only three men are required to work it instead of four as at present. This is of course an advantage, but as far as the efficient fire of a battery is concerned it will be casualties amongst the Officers and N.C.O.'s that will make the difference, not casualties amongst the extra men.

The scheme of having two Q.F. guns only per battery, and four wagons substituted for the remaining four guns of the present equipment does not commend itself; one efficient shrapnel would put half the battery out of action.

It is obvious that an increased rate of fire is being aimed at, would it not be possible to gain a lot in that direction without unduly improving the carriage ? The present rate of fire depends mainly on *fuze setting*, and the method of setting fuzes with a key seems a clumsy one, it would not be hard to find a quicker and simpler way.

Without introducing metal cases the operation of *loading* will have to remain as it is at present. Metal cases would be an abomination in the field ; they would work loose and would get dented. A charge containing its own means of ignition would be dangerous.

A tangent sight was tried at Okehampton this year and reported on not unfavourably. This sight did not require removal from the gun either when setting or when the gun was fired. The sight remained serviceable over the same ground that wrecked one gun and several carriages. Its adoption would greatly diminish the time taken to lay.

It would not seem a very difficult matter to get rid of the present tube and introduce a percussion lock and tube in its place, thereby minimizing the chance of miss-fires and broken lanyards which so constantly recur at present and which would be so demoralising on service.

Don't let us overlook the scythe!

OBSERVATIONS ON MR. KINGLAKE'S NARRATIVE OF THE BOMBARDMENT OF SEBASTOPOL IN APRIL, 1855.

BY

COLONEL F. A. WHINYATES, *late* R.H.A.

AS many officers of the Royal Artillery who served in the left attack before Sebastopol feel unwilling that erroneous statements respecting their work during the great siege should be handed down without comment to posterity, the following remarks are put forward to draw attention to the discrepancies between Mr. Kinglake's narrative of the events on April 13th and 14th, 1855, (*Invasion of the Crimea*, Vol. VII, Chapter VI, Sec. VI.) and that published in the *Proceedings, R.A.I.* in October last.

The differences which obtain in the details given in these two accounts may be attributed to the circumstance, that while one is based upon public and private records made at the time, Mr. Kinglake's is chiefly founded on individual recollection after a lapse of upwards of thirty years. (Appendix, *Kinglake's Crimea*, Vol, VII, page 367). Now memory, especially with respect to numbers, is notoriously treacherous, seldom trustworthy or to be relied on, and is inferior in all points to evidence furnished by contemporary documents. It is also probable that being a civilian, Mr. Kinglake has misinterpreted some of the information he was given, and he has certainly fallen into considerable error as regards some of the figures he quotes. It is easy to point out some of these mistakes.

In Vol. VII, page 152, Mr. Kinglake states that on the morning of April 13th, 1855, No. 7 battery was manned by three officers and 65 men. Now the battery was armed with four 32-prs. the detachments for which at six men per gun[1] would be 24 men, which with two laboratory men makes a total of 26 men. It seems as though Mr. Kinglake by mistake has quoted the numbers engaged in Nos. 7 and 8 Batteries on the following day, when the gun crews for the eleven 32-prs. in those batteries, with four laboratory men, would amount to 70 men with four officers.

That the smaller number of men as stated for No. 7 on the 13th is correct, is fully established by the fact that the strength of the whole left attack reliefs on April 14th, when both No. 7 and 8 were in action, was 11 officers and 316 men, whereas on the 15th, when these batteries were not manned, the strength of the reliefs falls to seven officers and 245 men[1], the difference being exactly the number of the four officers and 70 men required for the eleven 32-prs. (at six men per gun) in the two advanced batteries.

---

[1] See *Artillery operations by R.A. and Naval Brigade before Sebastopol, 1854–5*; by Major W. E. M. Reilly, C.B., Brigade Major, Siege Train.

At page 160, it is stated that two fresh gun detachments went down to No. 7 battery during the five hours it was in action on the 13th. This is improbable, for there were no spare men in the trenches, the Royal Artillery being far too short handed to have present other men than those actually working the guns in the different batteries.[2] To have provided fresh detachments, men must have been brought from camp, which would have taken at least three hours; they would have come with a proportion of officers, and such an arrangement would have been practically a relief, of which we have no official record.

At page 159, it is stated that the Russian heavy guns were firing almost point blank at our advanced battery. Now the point blank range of a 68-pr., the heaviest gun in the Russian works, varies from 300 to 400 yards in proportion to its weight of 87, 95 or 112 cwt. The shortest distance between the opposing works was upwards of 750 yards; the Russians must therefore have been firing with over 1° of elevation.

At page 164, it is stated that the four guns in No. 7 battery were disabled on the morning of the 13th of April, but the artillery and engineer official returns agree in shewing that but one gun was disabled and that by the fracture of a wheel of the carriage. The other guns were probably temporarily out of action through the disruption of the embrasures.

At page 166, the casualties in the advanced battery, No. 7, on the 13th are set down at 44 killed and wounded, but the official return clearly shews that the casualties in the whole left attack on that day were three killed and seven wounded, and during the ten days bombardment only amounted to 13 killed and 25 wounded.

In conclusion it may be observed that though Mr. Kinglake has been desirous of chronicling a remarkable deed of arms, yet through faulty information and misconception, he has presented an inaccurate account of what actually took place, and has failed to realize that of the two days fighting, that on the 14th was most prolonged and severe. His narrative, however, agrees in the main with official and other document so far as they record that on the days in question all performed their duty well, that the guns were gallantly and persistently served, and that the contest reflects credit on those engaged, and on the Royal Artillery.

---

[1] Morning states of left attack.

[2] The paucity of gunners was severely felt at this period of the siege, so much so that a detachment from "J" Field Battery which arrived in Balaclava harbour on April 8th, were at once marched under Lieutenant C. Lennox Tredcroft to the right siege train camp and served through the bombardment.

THE SERVICES

OF

LIEUT.-COLONEL FRANCIS DOWNMAN, R.A.,

IN

FRANCE, NORTH AMERICA, AND THE WEST INDIES BETWEEN THE YEARS 1758 AND 1784.

EDITED BY

COLONEL F. A. WHINYATES, *late* R.H.A.

CHAPTER III.

RARY
U. NOV 21 1898
PATENT OFFICE

The manœuvres of the English and French fleets.

January 7th, 1779.—Admiral Byron on the passage fell down and broke two of his ribs and is not yet recovered enough to venture on shore. His fleet is very busy watering and preparing to pay a visit to M. d'Estaing.

January 9th.—A frigate, the *Weasel,* sailed for England with despatches. I sent Lord Townshend[1] a sketch of the different attacks of the enemy on our fleet and army. Wrote also to Mrs. D.

January 11th.—The ship that went to Martinique with French prisoners returned to-day, bringing the men and officers taken in the *Ceres.* In the transport also came Captain Downing and the light infantry men with him, and two artillerymen taken in one of our horse sloops. We learn by this ship that the people of Martinique are very much dissatisfied with d'Estaing and the officers of his fleet, so that they will hardly suffer them to walk the streets.

January 12th.—About noon we saw a fleet standing out of Fort Royal harbour; it directed its course towards us. A frigate of ours went out about 2 o'clock, and after a little while made the signal for an enemy. We could discover about sixteen sail,—twelve large and four small ships. Everyone of us is in high spirits; we flatter ourselves that d'Estaing is at length determined to attack the British fleet.

January 13th.—At 3 o'clock this morning Admiral Byron made signals to unmoor ships, at daylight they got under way, and at 7 the whole, consisting of thirteen line of battle, one fifty, and three frigates were under sail lying off the Careenage with their heads towards the French fleet, which we saw plainly turning to windward not far distant from their own port. At 8 o'clock, Byron made the signal for his fleet to form the line of battle which was instantly done. They then set their top-gallant sails and stood away for Morne aux Bœufs in beautiful order. The French fleet, when it saw ours, tacked and stood for the shore. At 11 the fleets seemed to be about seven miles apart, both on the starboard tack, the English to windward. About 12 our fleet was crowding sail, but in excellent order and was close under the Martinique shore.

---

[1] Master-General of the Ordnance.

Now Byron, you have them in your view, and if you cannot get them within your reach you are truly unfortunate. We are under no fear or apprehension of anything but of d'Estaing running away. About 1 o'clock we could plainly discover the intrepid d'Estaing pushing back to Fort Royal harbour, and Byron, to all appearances, no great distance from him. In the evening, about dark, our Byron returned from the chase of d'Estaing without being able to do anything against him. The Frenchman was extremely careful not to get any of his master's ships hurt, and to secure them perfectly, he ran up the harbour of Fort Royal, and Byron came back and anchored his fleet in the bay where the French fleet lay when they did us the honour of a visit. Just after Byron went to meet Monsieur, a large ship with French colours approached to leeward. The *Bunker's Hill*, which is now put into commission, gave chase and in a little time was alongside the Frenchman, who struck his colours the very instant he saw the English flag.

January 14th.—The ship taken yesterday proved to be an English one from Halifax taken by the rebels within sight of Barbadoes.

This morning Admiral Byron with seven or eight ships weighed anchor and stood to windward; in a few hours they came to, some in and some opposite the Gros Ilot harbour.

Our soldiers begin to fall sick; already there are a great many dead and ill. Captain Chetwynd, 46th and Captain Cadogan, 49th, died after a very short illness. It is feared, and not without good reason, that if we remain much longer on this horrid island, one-third of our troops will be unfit for service.

January 15th.—Admiral Byron was joined by the *Fame*, one of his own fleet, she is disabled in her masts. Several frigates have also arrived.

A dreadful day with wind and rain, both of which continued all night with great violence.

January 16th.—Admiral Byron has got all his fleet into the Gros Ilot bay. It seems to be more under cover of the wind than the Grand Cul de Sac, and this great advantage attends it that it is seven or eight miles nearer to Martinique and to windward withal. From the hill I am on I can see ships going in or out of Fort Royal harbour at least an hour before the men-of-war can from their top-gallant masthead. Wind and rain most of this day.

January 17th.—Lieutenants Vallancy and Stotesbury, 55th Regiment, are both dead of the fever of this country, and many others are not expected to live.

Our fleet and army are both lying idle, for why or wherefore is best known to the man of Morne Fortune[1] and the unfortunate man.[1] I am told the fleet is sickly, both officers and men; that the army is so I know for certain and dread the consequences of remaining here three or four months longer, which we are told will be the case, or until we hear from England.

Melancholy prospect! Death seems to stare us in the face whichever way we turn. Why do we stay here, now we command the sea? Why not move to some other island? Why not to Dominique? It were better to die attempting to retake that place than to perish here and do no good. We are too late they say, we should have set off the moment Byron arrived. We have given the French time to recover the beating they got here and to reinforce and fortify that island, so that we are not able to attack it with any prospect of success. It were better we were doing anything than to remain here inactive. Men's minds as well as their bodies should be employed; when that is the case you need not be apprehensive of sickness. Our men are employed, but at what sort of work? Why, in mending roads up and down hills almost perpendicular, when perhaps it is raining the whole time they are at work, and, what will appear very extraordinary, they are ordered to work till 12 o'clock and to go on again at one! This is not only dreadful on account of the heat of the sun, but the poor wretches have scarce a moment to themselves after eating their morsel of pork.

January 19th and *20th.*—Rain and wind. Admiral Byron's cruisers have re-taken several vessels taken by two rebel privateers that keep in the latitude of Barbadoes to intercept the English ships.

January 21st.—Rain as usual.

January 22nd.—More rain. The devil take this country!

January 23rd.—Rain *encore.* Admiral Byron has sent the *Bunker's Hill* (now the *Surprise*) with two frigates to look for the rebel privateers, who know nothing of her being taken. She is to hoist rebel colours, and the frigates French, and as they know the *Bunker's Hill* and expect to fall in with her every day, as they told the mate of one of the ships they took, it is probable the device will answer.

January 24th.—Very severe wind and rain all night. This morning a fleet of 13 sail appeared round the north end of the island, they lay to for some time near Byron, and then made sail as if for Jamaica.

I received a letter from Bobby Day from Falmouth, dated October 16th. No war. Strange doings!

January 25th.—Rain and wind almost the whole day, and in the night both were excessively severe. In no small danger of being carried away, tent and all, down a precipice of 400 or 500 feet. Taken ill this afternoon, a violent commotion and desperate battle internally, and a fever during some part of the night.

---

[1] General Grant and Admiral Byron.

January 26th.—Wind very high, but no rain. I am a little better, but find myself very weak from the effects of my illness of yesterday.

Violent rain and wind has continued from the 26th to this day, February 2nd, which was brilliantly fine though not without rain.

This morning four or five French men-of-war sailed out of Fort Royal harbour and stood up along the island to windward. Admiral Byron sent some of his ships after them. The Frenchmen put about and scampered into port again. We are informed that the *Weasel*, sloop of war, that was ordered home with despatches, is taken by a French frigate and carried into Guadeloupe. This day arrived from England the *Pomona* frigate, she left England on January 5th and parted from the West Indian fleet on the passage.

February 3rd.—This morning 500 men from the different regiments embarked on board Byron's fleet. Sickness on board is the cause of this manœuvre. From this day to the 13th perpetual rain and wind.

February 13th.—This day arrived Commodore Rowley with seven line of battle-ships. He came to anchor with Admiral Byron off the Gros Ilot. It is now five weeks since Byron arrived. It is not improbable but he will remain five weeks longer in harbour. We are told that many of the enemy's ships have lately got into Fort Royal and St. Pierre, Martinique. Very possible, for though we are now again master of the sea, and have ships enough to draw a line round that and the other French islands, yet we do nothing but lie at anchor in our own harbour!

Commodore Rowley sailed from England with the West India fleet.

From the 13th to 23rd February, every day and night an abundance of rain and wind.

Commodore Rowley, who has been out with seven ships cruising two or three days, returned this morning.

A fleet of French ships has got into Martinique, to the shame of Byron, who feared d'Estaing would make a sally upon him in his Gros Ilot; notwithstanding he has 16 or 17 ships of the line, he sent in a great hurry to recall Rowley.

February 24th.—It is a shameful circumstance that an English admiral with 24 line of battle-ships and a number of frigates should suffer five or six French men-of-war to get into a harbour that lies within our sight. We are just now informed of eight more French men-of-war getting into Martinique last night, which, if true, will make M. d'Estaing's fleet 25 sail of the line and 17 frigates. All the transports, except 20, sailed for England. This number will more than contain us if we remain much longer in this country.

Rain all the morning.

February 25th.—Rain all the morning, last night and this whole day. Struck my tent and retired to a hut which I have just finished. From this time to March 2nd things have been much as they were, that is to say, a great deal of wind and rain. Byron and his fleet are just where they were, immovable, except now and then a ship or two sent out for an hour.

March 3rd, 1779.—To-day the fourteenth officer, since our landing, was buried. But little rain to-day.

March 4th.—A fine day. In the evening, a quarter before eight o'clock, a shock of an earthquake was felt, which continued about four seconds. Some thunder and lightning in the afternoon.

March 5th.—A fine day. Thunder at a distance. Fourteen sail of Byron's fleet at length went and shewed themselves before Fort Royal harbour and returned in the evening, d'Estaing not choosing to come out.

Captain Packenham, of 27th Regiment, died this day. A soldier of the 28th Regiment was attacked and bit by a very large snake, and died in 24 hours afterwards. He described the snake as being as thick as his thigh and its mouth so large that it grasped the calf of his leg. He was only half an hour before he got assistance, yet a mortification came on quite up to his groin. Had he got immediate application, probably his life might have been saved.

March 6th.—Our fleet did not come to anchor on its return, but cruised off and on the Gros Ilot, and in the night returned close under Martinique and continued about there the whole day.

March 7th.—The rain not so abundant as usual, the weather is also much hotter. Our fleet continued cruising sometimes to windward of Martinique, and at others before the harbour where d'Estaing lies with his fleet.

March 10th.—An exceeding hot day, the clouds and fog are close upon the earth, and not a breath of wind. A night of incessant rain, thunder and lightning. Several cannon were fired at sea, or at the Gros Ilot.

March 11th.—A fine morning. Two or three more ships went out last night from the Gros Ilot and joined the cruising fleet, they are not to be seen this morning, being to windward.

March 12th. — A fine day. The fleet cruising off Fort Royal harbour.

The weather to this day, the 16th, has been variable, generally rain in the 24 hours. Our ships of war that were cruising off and on, all came in this day and some others went out. This morning very early we discovered one of our ships making signals for an enemy and standing from Martinique. Our whole fleet were all out of the Gros Ilot and under way by about 9 o'clock. We now can perceive the French fleet off the harbour of Fort Royal, the weather is hazy and we cannot distinguish their number. Our fleet are all standing with moderate sail directly over towards them; they weighed in three divisions. Our fleet lay to for a long time when the French fleet was near them. Strange! D'Estaing ran into his harbour again, and *our* d'Estaing came away directly.

March 21st.—Our fleet is only now come to anchor from driving d'Estaing into port again, the currents drove them much to leeward.

I was attacked with a fever, but thank God was quite recovered in five or six days.

The *Venus*, frigate, has taken the *General Trumble*, a rebel ship of 20 guns, and brought her into Gros Ilot.

April 2nd, 1779.—A sloop was taken to-day within our sight by a schooner of ours, we are told she is a rebel vessel from Charlestown loaded with rice and flour, a good prize at this time.

Our amazing fleet of men-of-war are still lying in the Gros Ilot, and what Admiral Byron can be dreaming about is a matter of much astonishment to everybody.

April 5th.—We learn that Colonel Campbell, of the 71st Regiment, is in possession of all Georgia and has killed a great many of the rebels.

We are informed for a certainty that the last time d'Estaing passed out of his harbour, he was induced thereto by being told by a person who called himself a relation of Dr. Franklin, that the English fleet then at St. Lucia were in a very sickly condition and unable to man the few ships that were there, and that the remainder of the fleet were out on a cruise. D'Estaing, being assured by the relative of his old friend and ally Franklin that this was actually true, treated his informant with much respect and attention, embarked 4,000 men aboard his fleet and was certainly about to pay us another visit that day. Had not Byron, Byron-like, always wrong, sallied out with all his fleet against the enemy's 14, the Comte might have been taken in. As matters were, I am credibly informed that Byron that day could have taken or brought to action seven of the enemy's fleet. 'Tis strange! 'Tis passing strange! 'Tis wonderful! You won't believe me perhaps when I tell you, that either French or Rebel privateers have taken an English vessel or two within a few miles of us (near the Soufrière). Not long ago I was down at this Soufrière, a place well worth seeing, about 12 miles from the Careenage. I then saw a vessel taken that only left us an hour before. You would naturally conclude from these facts that we had no vessels to cruise, but, take my word for it, I have before my eyes at this moment about 30 sail of ships of war.

A good story of Monsieur Byron.

He went out the other day after d'Estaing. While cruising he fired a gun to call attention to the signal flying at the same time on his ship, and summoned the next in command, Admiral Parker, to come on board. On his arrival Byron asked what he was about that he did not form the line according to the signal.

Admiral Parker said he had seen no such signal.

"No such signal!" replies the Admiral—"Look aloft and see the signal."

Says Parker, "No sir, I have no such signal in my instructions."

Admiral Byron cast his eyes aloft, lo! and behold! it was a dream, or something like one, for his signal officer had rendered the signal unintelligible by hoisting in mistake a Dutch Jack instead of an English one!

The French fleet formed line to leeward under the shore. The English fleet made a bow to them and came back, and now for fear of making any more mistakes, are determined to remain in port.

April 19th.—Our admirable Admiral is informed that within this week upwards of 60 vessels, escorted from St. Eustatius by three men-of-war and ten frigates, have got safe into Martinique and Guadeloupe with provisions for d'Estaing's fleet and army which were in great distress till their arrival. Had the English admiral done his duty this fleet must have become the prize of our fleet. He has also learnt that several French ships are off Nevis and St. Kitts, the inhabitants of which islands are watching night and day expecting an invasion.

April 21st.—This day five of Mr. Byron's fleet got under way and stood over to Martinique and returned to anchor in the evening.

April 22nd.—The packet arrived from England, but no letters for the army, except a very few.

April 26th.—This morning four frigates came into the fleet from the windward, and in the evening several other ships. They are the Cork fleet with provisions.

April 27th.—Four of our men-of-war went last night from the Gros Ilot, and this morning one sees them off Fort Royal harbour. I begin to suspect d'Estaing has again given Byron—a Bye-run.

This morning Admiral Byron has had the flag flying for all boats and everyone belonging to the ships to be on board. Eight sail of large ships hove in sight to windward and kept down under the shore of Martinique, standing to Fort Royal. Afternoon.—The four ships above mentioned prove to be French, now joined by five more and are cruising off and on their harbour. The eight ships that are to windward are English, they went out last night and are now returning into harbour, the French ships are still cruising about. Admiral Byron is lying as still as a mouse. I wonder at his philosophy; to command such a powerful fleet and yet suffer d'Estaing to go in and out of his port as he pleases, 'tis scandalous to say the best of such behaviour.

April 29th.—We are informed this day that several men-of-war, five of which are absolutely French, are lying off St. Kitts and Nevis. Some are of opinion that Nevis is at present, or will be in a short time, in the possession of the French, or else destroyed and pillaged.

April 30th.—To-day there appears by the signals, etc., amongst our fleet in Gros Ilot, an intention of moving soon. This evening a frigate came to the Careenage and received from the different transports a number of volunteers, who went with loud huzzas and in the greatest spirits on board those ships of Byron's that wanted men.

May 1st, 1779.—At length the fleet of Byron is roused from its slumbers. At 8 o'clock a.m. the whole were under way and standing over towards Fort Royal harbour in order of battle, and about one o'clock they were off the mouth of the harbour. In the night some people heard cannon and saw flashes of fire at a great distance; imagination sees and hears many things that never happen.

May 3rd.—All day yesterday an abundance of rain and continued through the night. This morning the wind blows from the S.W., a very uncommon circumstance; this is the second time it has happened since our being here. Nothing transpired yet of what Byron has done.

The *Boyne* and *Medway* of the line, the *Venus, Diamond* and *Aurora* frigates, with two or three prizes and some store ships, being all that are left here by Byron, all left the Gros Ilot and came into the Careenage as a much safer place in case M. d'Estaing should pay us another visit in the absence of our mighty Mingo. The *Centurion* of 50 guns came in from the windward this afternoon.

May 4th.—This morning early we saw to our astonishment six French ships of the line, two frigates and a sloop at very little distance from the Gros Ilot. The sloop looked into the Cul de Sac and Careenage, the frigates into the Gros Ilot, they then stood from the shore to the large ships, upon which the whole of them immediately wore round, and about 8.30 a.m. stood towards Martinique in a regular line. The atmosphere very thick so we can see but a little distance from the shore. The *Boyne, Medway* and *Centurion* are drawn in a line across the entrance of the Careenage, behind are the batteries ; the frigates and all other vessels are warped up much within the large ships. Can the Devil, or anybody account for the wonderful and extraordinary management of this mingo of the great canoes ? He left us three or four days ago with twenty sail of the line and his back is no sooner seen than we are again blocked by the French.

May 10th.—This morning early we saw a large fleet off the north end of Martinique beating up. In the evening they were not far from the Gros Ilot. 'Tis our friend Byron come back again, he has shewn himself to our islands to leeward—he looked into Martinique, saw there 17 sail of the line and a number of frigates, also into Dominique and Guadeloupe where many vessels might have been taken without loss, but it is beneath the dignity of a vice-admiral of the Blue to attack anything less than a ship of war!

May 11th.—This morning his whole fleet anchored in the Gros Ilot. The ships that were in the Careenage are ordered to join him directly. He is afraid d'Estaing will come out and eat him at a mouthful.

May 18th.—This afternoon the frigate *Porcupine* from England arrived. By her we learn that the *Pearl* got to England on March 24th with the general's despatches on taking this island. The frigate sailed on the 27th, she has brought money for the army, but no letters to relieve us from an anxious suspense. No letters in answer to the *Pearl.*

May 19th.—Very early this morning we were roused by cannon firing from our fleet at Gros Ilot. Commodores Rowley and Graves are made Rear-admirals of the Blue, and Rear-admiral Barrington vice of the Blue.

May 24th.—Five hundred of our recovering soldiers with their officers went on board Byron's fleet. This afternoon a small ship entered the Gros Ilot from windward, supposed to be the packet or ship with despatches in answer to General Grant's letters by the *Pearl.* She saluted the Admiral with 13 guns. About 12 o'clock at night the mail and General Grant's despatches arrived at head-quarters from Gros Ilot.

May 25th.—This morning at day-break signals were made in the fleet at Gros Ilot for all boats, etc. to be on board and the top-sails loosed; at the same time a frigate came down to the Careenage to receive volunteer sailors from the transports, which she did and returned immediately. About 3 in the afternoon, the whole fleet got under sail and stood to windward.

May 26th.—This evening the packet and several other ships sailed from the Careenage bound for England. Orders were given out by General Grant for the three following regiments to be left on St. Lucia:—27th, 35th and 49th, under command of Sir H. Calder. The 5th and 46th to go on board Byron's fleet as marines, and the 4th, 15th, 28th, 40th and 55th to go to America under General Prescott. Generals Grant and Medows go for England. Artillery orders are for Captain Downman with four subalterns and 80 men, with surgeon, clerks of stores, etc., etc., to remain in St. Lucia. Captains Williamson and Standish with the remainder of Artillery to go to America.

June 1st, 1779.—It began to rain most violently with very high wind and continued for four days, except some short intermissions.

June 4th.—A French prize brig came into the Careenage this morning taken by Byron's fleet. A cutter from France with despatches is also taken, by which Byron is informed of a reinforcement of seven ships and 5,000 men being on their passage for d'Estaing under M. de la Motte Piquet.

June 6th.—This morning, early, a fleet of 26 sail appeared in sight to windward which we suppose to be Byron; soon after the whole of them sailed close along shore, passed the Careenage and went away to leeward with a press of sail, the *Princess Royal* the headmost ship.

June 7th.—A fine morning. We can perceive a fleet of about 50 sail to leeward at a great distance. We imagine it is Byron convoying the Granada fleet out of danger from Martinique: we also observe four French men-of-war off Fort Royal harbour which have taken a look at the fleet and are now going into port again.

June 8th.—This morning four French men-of-war came from Martinique, looked into the Gros Ilot and Careenage under English colours, then wore round and stood away. They did not come within cannon shot of us.

June 10th.—Early this morning we discovered eleven or twelve sail of French vessels standing from Fort Royal towards us; five of them were men-of-war. About 3 o'clock in the afternoon two of them after standing in almost close to the Gros Ilot and into the Choc bay came down opposite the Careenage, but at not less distance than a mile or more from the rock battery, from which I fired a shot at a great elevation which fell on the further side. They immediately hoisted English colours and stood to windward, and in the morning after lying off the Gros Ilot returned to their shore. We were apprehensive they meant to take off Mr. Byron's 800 sick sailors and marines lying at the Gros Ilot, with nothing to protect them but two 6-prs. lately sent from the Careenage. Mr Byron has gone, the Devil and the French know where, for no sooner is he away than we are braved by them and any vessel coming to us is liable to be taken, for he has not left us a single sloop of war. If his fleet does anything of the smallest consequence while he commands it, I'll eat one of his 74 gun ships.

June 11th.—Four or five of the French ships came and looked at us again to-day.

(To be Continued.)

ON FAILURES AT PRACTICE WITH THE TIME AND PERCUSSION FUZE MARK IV.

— BY —

MAJOR W. A. URQUHART, *late* R.A.

THE results obtained by batteries at practice when using the same mark of fuze, the Time and Percussion Mark IV., vary so widely, there being in some batteries no failures at all, whereas others have as many as 10 per cent, that there can be no doubt that a very large proportion of the failures are due to preventable causes and not to defects in the fuze or shell.

It may, therefore, be of some use to officers who use the fuze, if I mention all the causes of failure that have come to my knowledge and make a few remarks on them.

A.—*Blinds* or *reported blinds* may be due to

1. Safety pins not pulled out or broken off in pulling out.
2. Defective fuze.
3. Bad clamping.
4. Weak shell.
5. Spindle of fuze or head of shell breaking off on impact.
6. Distortion of fuze or head of shell on impact.
7. Features of ground concealing the burst.
8. Faulty observation.
9. Shell smothered in soft ground.
10. Range too short for percussion arrangement to act with certainty.

B.—*Shot bursts* or *bursts in bore* may be due to

11. Bad setting.
12. Bad clamping.
13. Both safety pins being withdrawn (when firing ranging shots).

14. Weak time safety pin (thousands previous to 152 only).
15. Defective fuze.
16. Weak shell.
17. Escape hole blocked by any foreign substance.

C.—Long bursts may be due to

18. Bad setting.
19. Bad clamping.
20. Escape hole partly blocked by foreign matter.

The reasons for some of the above are clear, but others seem to require some explanation; taking them as numbered

1.—The *safety pins* are sometimes broken off at the eye, either whole or half of the split portion remaining in the hole, by the No. 3 not pulling them straight out (see remarks on 3), he thus cuts them against the sharp edge of the hole. If half the time pin were left in the hole it would probably be sheared on firing.

2.—*A defective fuze* may cause a blind either from non-ignition of the time ring, which is almost unknown, or from failure of the percussion action either from (*a*) the needle being blunt or soft or the brass disc covering the detonating composition too thick or hard; (*b*) the centrifugal bolts not drawing clear of the slot in the body, or (*c*) the safety pellet and ball may not drop and clear the needle pellet, but a failure has never been known to occur from this cause.

3. 12. 19.—*Bad clamping*; this appears under all three heads, *A*, *B* and *C*, and may account for any form of failure.

When the No. 3 is pulling out the safety pins he seldom pulls them in the direction of their length, as they are not set vertically to the ring and body but transversely across them.

If the fuze is not well clamped the ring may be pulled round to any point. I found that with the ring set at 2 and the nut clamped only with the hand or lightly with the key and the shell held as a man would usually hold it, I generally pulled the setting round to a point between 0 and the safety ⩛, others pulled it over the safety mark and on to the long setting beyond it. If the setting is at 0 the burst is just outside the gun, 20 to 40 yards probably; if at a point about one third of the way between 0 and ⩛ the burst is almost instantaneous and is in the gun; if from this point to about one third of the way between ⩛ and 18 the time action is blind, the fire hole leading to the magazine and percussion part of the fuze being covered by the bridge, but if the ring is pulled still further round the burst becomes long or short according to the extent it is displaced. Also in lifting the shell out of the magazine, the No. 3 may give the ring a twist and displace the setting, if the clamping is not properly done.

4. *Weak or defective shell* may cause a blind in two ways.

(a) The head may set back and break the central tube, or the head may be broken off on impact.

(b) If the disc supporting the bullets is weak the weight of the bullets setting back on to it may cause it to buckle down and tear away the central tube from the fuze socket.

In either case the continuity of the passage for the flash of the fuze is broken, and it can not reach the bursting charge in the base of the shell.

5 and 6.—If the spindle, and with it the head, of the fuze is broken off or distorted on impact so that the fire hole in the seating of the time ring is practically left uncovered, a portion of the flash passes upwards and the remainder may not have sufficient strength to ignite the bursting charge.

9.—In soft ground the shell may penetrate so far that the burst cannot be seen, the fuze will not be extinguished as the composition contains its own supply of oxygen and does not require a supply of external air for burning.

10.—The percussion arrangement can not be relied on to act at angles of incidence less than 2°, that is at ranges less than about 1,000 yards in the 12-pr. 6 cwt., and 1,150 yards in the 15-pr.

12.—In addition to the results explained under (3) bad clamping has a tendency to cause short bursts, because if the time ring and leather washer are not well pressed down on to their seating on the fuze body the flame has a tendency to jump across from one portion of the composition to another and cause it to burn short.

13.—In this case the fuze might be fired set at 2, or on the short portion of the time ring.

14.—In fuzes previous to 152 thousand it was found that the time safety pin sometimes sheared when firing percussion shell, the pin has been strengthened and the fuze is now free from this defect.

15.—A burst in the gun may be caused by a rebound of the needle pellet, this could only happen if the centrifugal bolt had not engaged in the slot in the body or had been left out.

A short burst may be caused by

(a) The needle pellet creeping; this is almost impossible in the Mark IV., as a feather in the body engages in a slot in the pellet and compels them to move together moreover the spring checks any tendency to this.

(b) A defective washer under the composition ring or defective seating under the washer may allow the flame of the composition to jump as explained under (12).

16.—A *weak shell* may break up in the bore, this is most improbable with a forged steel shell; or if the steel disc supporting the bullets is too weak to sustain the shock of discharge, the whole mass of the bullets may set back on to the powder charge with sufficient violence to fire it.

17.—If the escape hole is completely blocked the flame will, when the gas has got up sufficient pressure, burn up the leather washer and run along the surface of the composition causing a short burst.

19.—Bad clamping may contribute to a long burst if the clamping is not sufficient to prevent the ring being pulled round, when the safety pin is drawn out, as explained in (3).

20.—If the escape hole is only partly blocked, that is, so as to allow a certain amount of escape, or so blocked that the obstacle is driven out when the gas attains sufficient pressure, the composition will, in the former case, burn more slowly all through. and in the latter case, slowly at first and at the normal rate when the obstruction is blown out. The slowness of burning is caused by the increase of pressure, and in this case, as the washer is not burnt, the flame can not behave as in (17).

Fuzes are now sometimes carried set at 2 and in that case there seems to be great risk of ranging shots being fired with the time pin drawn and the ring so set; indeed there is no doubt that this is frequently done, and the fact that when fuzes are set at 2 the loops of the two pins come together renders it the more likely to occur.

It is proposed to insert the time pin so that the loop will be at a different point, but I think that the present is the best position for the pins and that the men should be trained *always* to draw both pins and to set the time ring at the safety point ↟, or a little beyond it towards 18, when firing percussion shell for ranging, the fire being slow there will be plenty of time for the setting. If both pins are invariably drawn the action will be done without thinking and become automatic, and if there is any action in the service of the gun that should become automatic it is that of pulling out the pins, whereas if the men are taught sometimes to draw out the pin and sometimes not, they may not draw out the time pin when necessary or may draw the wrong pin.

The list of possible causes of failure may seem at first glance a rather formidable one, but most of them are possible only, and will very rarely be met with when the fuzes and shell are in actual use. There are really only three which need be considered and guarded against usually in actual practice, viz., not drawing the pins, or drawing the wrong one, bad setting and bad clamping.

I may seem to have laid undue stress on the possibility of the time ring being pulled round when drawing out the pins, which can only happen when the clamping is defective, but a number of short bursts occur which can not be accounted for on any other supposition, they are so far wrong that they can not possibly be attributed to inaccurate setting or irregularity of burning.

In writing the above, I have had the 15-pr., and 12-pr. 6 cwt. guns in my mind, but most of the remarks are general and, though I have probably stated little that is not already well known to battery officers, yet this paper may be of some service if only as a collection of the possible causes of failure of metal time and percussion fuzes of the present service type in a convenient form for reference.

NOTE.—This paper was written in April last and since then changes may have been made which may render a portion of the paper inapplicable to present conditions. I believe, for instance, that the position of one of the safety pins has been altered.

RÖNTGEN RAYS UP-TO-DATE.

PRÉCIS

Of a Lecture delivered at the Royal Artillery Institution, Woolwich, 27th January, 1898.

— BY —

W. WEBSTER, ESQ., F.C.S.

THE lecturer, after mentioning the great improvement in controlling the X Rays since his lecture of 1896, went on to state that Professor Jackson, of Kings' College, had invented his focus tube in 1894, nearly two years before Professor Röntgen's crowning observation; Jackson also worked with a phosphorescent screen, but confined his experiments to material objects such as leather, wood, vulcanite and metals. Mr. Webster then exhibited Jackson's original tube, showing there was no absolute difference in the form as now used all over the world; the tubes being an improved form of Crooke's tube, whose work in electric discharge in high vacuo led up to the discovery of the properties of the X Rays. A 20-inch induction coil made by Messrs. Newton and Apps was then exhibited in action, giving a 20-in. continous spark between the dischargers, it was explained that a 10-in. coil of the same make would produce similar results as the 20-in. in vacuo, but that the high vacuum tubes required rendered it necessary to work the 10-in. coil at its highest capacity, whereas with the 20-in. coil forcing was not necessary and there was less sparking at the make-and-break. Special mention was made of the perfect working of the Apps' make-and-break.

The focus tube having been attached to the dischargers of coil, a practical demonstration of conditioning the tube by heating behind the cathode was given; by this heating the phosphorescent discharge in vacuo showed the violet colouration behind the anode when the anode was red hot with an almost white hot spot where the discharge impinged at the focal point, ultimately the violet gradually disappeared leaving the phosphorescence a yellow-green tint. At this point shadows of hands and arms can be photographed in from a fraction of a second to five or six seconds. The trunk of a child showing ribs, heart, etc., can be taken in 30 seconds or even less; the adult trunk in two or three minutes. Prints of photographs illustrating these results were handed to the audience.

Vacuum tubes showing different degrees of exhaustion were then exhibited in action, including one enclosing chemicals which had the property of phosphorescing when the electric discharge was stopped.

The following phenomena had been seen by the lecturer and others during a course of experiments, markings in the electrical mollecular film clinging to the interior of the tube, similar to the markings on the planet Jupiter; a mottled appearance similar to the photographs of the photosphere of the sun with a black spot similar in form to a sun-spot travelled round the clinging electrical film on interior of tube in like manner; on one occasion the tube exhibited practically no phosphorescence, but on exposing the head of a subject in front of a phosphorescent screen, the whole of the articulation of the skull had been seen, and most distinctly, shadows of the soft tissues. A photograph showing the so-called Dura Mater of brain was exhibited, having been taken accidentally by the lecturer. Reference was made to the importance of conditioning the tube as demonstrated, otherwise satisfactory results either on screen or sensitive plate could not be obtained.

During a demonstration of the spectrum on a white screen, it was explained that some scientists thought that the X Rays were probably intimately related to the ultra violet rays of the spectrum, and an interesting incident, which had occurred the day before at the R.A. Institution while adjusting the apparatus for the lecture, was related: that Mr. Webster and Major A. J. Abdy had apparently seen the shadows of the bones of their hands on the phosphorescent screen when exposed to the ultra violet rays of the spectrum. (Some weeks after this lecture, by the kindness of Major A. J. Abdy, this experiment was repeated and for a second or two the shadow of bones in the palm of the hand were apparently seen on blotting paper prepared with eosine). Refraction might deceive the eye as regards the fingers, but the faint continuation of the shadows in the palm of the hand seem to point to Rays connected with the so-called X Rays.

Reference was made to the action of the rays on skin, but out of 260 cases the lecturer had not observed any permanent mischief, out of this number three cases only being temporarily affected; the action seemed to be very similar in two cases to severe sunburn, and in one case to electrolytic action. It was explained that it was possible to detect aneurism of aorta and abnormal condition of heart, also calculus, and tubercle in lung with a properly conditioned tube; sarcoma, cancerous growths and fibroid tumours had also been diagnosed shadowgraphically.

The rays had also apparently affected beneficially rheumatic and neuralgic subjects in ameliorating pain and stiffness; it had also been reported that Lupus and Elephantiasis had been cured by the X Rays. (Since this report the lecturer had come across a case of apparent stoppage of an artificial growth of Typhoid Bacteria).

An interesting episode was related of a subject brought by Surgeon-Major Dodd from the Arsenal just before the lecture; a workman, through an accident, had a small piece of blacksmith's flake iron in his arm which could not be detected by ordinary means, placed before a phosphorescent screen it was detected and a mark made on the arm; before the close of the lecture the piece of metal which had been cut out was sent from the Arsenal and exhibited on a plate to the audience. Special reference was made to the excellent X Ray work carried out at the Miller and St. Thomas's Hospitals.

Lantern slides were then thrown on a screen showing the advance made in reducing the time of exposure, and unavoidable errors in surgery due to the non-use of X Ray apparatus.

The lecture concluded with hearty thanks tendered by Colonel H. S. S. Watkin, C.B., the chairman, in the name of all present.

After the lecture Mr. Webster very kindly gave individual members of the audience opportunities of inspecting his instruments and apparatus and of testing the extraordinary state of transparency produced by tubes treated as recommended by him in the lecture, acting through the medium of a phosphorescent screen.

THE DEVELOPMENT OF ARMOUR DURING THE YEARS 1893-98.

BY

CAPTAIN C. ORDE BROWNE, *late* R.A.

Continued from No. 10, page 521.

Progress in Projectiles during the Years 1893 to 1898.

The adoption of Harveyed plates and others with hardened faces could not fail to tell on the manufacture of projectiles. Finding that the attack was defeated by fracture of shots point, makers naturally sought means to counteract this. As seen already this has been in a measure effected by placing on shots' points caps made either of soft iron, soft steel or hard steel. Such caps would vary in their action, but all would probably succeed in the measure in which they saved the shots point on first impact on the hardened surface of the plate. Once through the hardened face or skin, the point would probably stand up to its work. Against compound plates, caps were found to offer no advantage. This was concluded to be the case when caps were first tried at Shoeburyness, 1877, and trials made by the Committee on Ordnance in 1896 confirmed the conclusion. The conditions are altered because the steel shot of the present day hold together much better than the Palliser projectiles and while the existence afloat of compound armour makes it necessary to try the effect of capped shot on such a defence, the result is only what would have been certainly looked for by anyone who, like the writer, believes the action of the cap as simply a protection to the point—not a sort of lubricant as held by some in America. A shot whose point does not break against compound armour when unprotected can gain nothing by having a cap on it. As noticed already Mr. Hadfield has obtained considerable success by modifying the form of point. Only actual experiment can show whether its better to employ a cap or use a blunter point.

Up to the time of the introduction of Harvey armour, that is to say up to about 1892, Holtzers projectiles were generally regarded as the best extant and his 6-inch steel shot were used in England, America, Russia and France as a sort of standard projectile which offered the advantage of facilitating comparisons between the results obtained in different countries. In late years rival shot of improved quality have been made and this state of matters no longer obtains. The writer saw Carpenter 12-inch shot behave much better than Holtzer 8-inch as related at Indianhead. The former rebounded apparently undeformed, while the latter set up and bulged round the body in a belt-like bulge. Holtzer's 6-inch shot were apparently much better than the 8-inch, but he wrote a letter to the *Engineer* protesting against his shot (which had been delivered to England before 1889 before the invention of the Harvey process) being taken to represent what he would now supply. This most reasonable letter may serve to remind us of the necessity of keeping in view the date of manufacture of projectiles used in any trial. Probably Holtzer's shot are very good now if used fairly, but it seems most desirable that other than these ancient specimens should be used in testing our service plates, especially seeing that there is every reason to believe that our plates now bear attack as well as any that can be made, so that it is against their reputation to test them in a way that is open to obvious objection.

About 1893, the writer is satisfied that other nations had obtained better results with projectiles than had been got in England, and he is satisfied that the U.S. officers judgment may be relied on in concluding from their trials that the Wheeler Sterling had on the whole a better record than even the Carpenter. Herr Krupp considers that in 1896 he had proof that shot made by him had completely held their own compared with the Wheeler Sterling. Probably among the best of these there is little to choose. The following results obtained against Harveyed nickel steel with Wheeler Sterling shot in America deserve notice.

On July 12th, 1894, a 12-inch projectile, 850 lbs. weight, perforated a 17-inch plate and 18-inch oak backing, with 1858 f.s. striking velocity and was recovered only slightly injured.

On February 24th, 1895, a 12-inch projectile with weight and velocity as above, perforated a 14-inch plate and was recovered whole, except one inch broken off the point.

On June 15th, 1895, a 4-inch 33 lb. shot with a striking velocity of 2,000 f.s., penetrated 9-in. past the face of a 5½-in. plate uninjured.

In England, in August, 1894, a Hadfield blunt pointed 6-in. projectile with about 1,960 f.s. velocity, perforated a 6-in. Harveyed plate which defeated the Holtzer[1] shot used in proof, the shot was however broken.

Colonel Bainbridge made a shot in the Royal Laboratory which passed undeformed through 9 inches of steel (un-Harveyed).

Steel shot made by a process devised by Isaac G. Johnson, of Spuyten Deeyvil, gave remarkable results in 1896. Johnson's shot owes its power to three properties: (1) special quality and treatment; (2) solidity; (3) it has a cap on its point. On April 30th, 1896, a capped 6-in., 100 lb., shot passed through a 7-in. reforged Harveyed Carnegie plate, the shot being deformed to the extent shown in Fig. 26, which is the reproduction of a photograph of the recovered projectile. On

---

[1] Shot made before 1889.

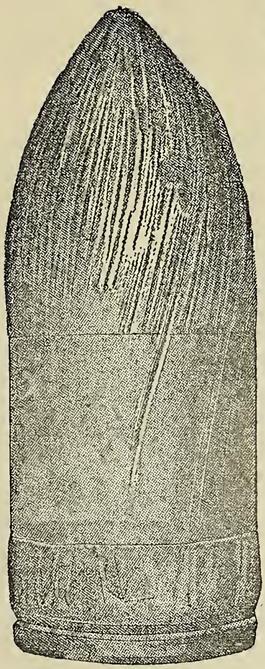


Fig. 26.

September 10th, 1896, some Johnson capped shot were fired at a similar plate 10 inch thick. The first weighing 100 lbs. struck with a velocity of 2,100 f.s., penetrating 8 inches and breaking off (see No. 2 point of impact in Fig. 27). The second weighing 105.25 lbs., striking with a velocity of 2,505 f.s. passed through the plate, 12 inches of oak and three $\frac{7}{16}$ in. plates and buried itself 8 feet in the sand behind. (See point of impact 3). The upper point of impact No. 1 shows the head of an 8-in. Holtzer (presumably without a cap) weighing 250 lbs., which struck with a velocity of 1,800 f.s. The calculated perforation of the second Johnson shot is 19·9 in. of iron. The behaviour of this shot is phenomenal. The cap is soft steel, its shape is shown on an unfired shot, Fig. 28 and the recovered shot last mentioned is shown next it.

Remarkable as is the performance of the Johnson shot, it is impossible to measure its powers, since there appears to be no record of its behaviour in strict comparison with other projectiles. It seems to have been invariably fired with a cap and other projectiles when fired on the same occasion have not had caps. It is also to be noticed that for the 6-in. gun A.P. shells are much more important projectiles than shot, seeing that these guns are not required for belt attack, but for lighter structural parts of ships which happen generally to be within the power of 6-in. A.P. shells.

Firth shot.

The principal makers of armour-piercing projectiles for the British service in recent years in England are Elswick, Firth, Hadfield and the Royal Laboratory. Of these Elswick and Firth for some time used the Firminy process. Latterly Messrs. Firth have considerably modified their process of manufacture to meet the requirements of hard-faced armour. Messrs. Hadfield have shown marked ingenuity and enterprize in the development of original English processes.

Hadfield shot.

Elswick projectiles.

In 1896 Sir W. Armstrong & Co., secured the Wheeler Sterling patent and have made some excellent projectiles by it. The great Engineer strike of 1897 caused some delay in the development of the manufacture.

Previous to that, a shell with a capacity of 4·2 lbs. of powder fired in comparison with a Holtzer shot, was reported as doing quite as well as the latter by an officer who was not acquainted with the fact of the former being a shell. The great importance of armour-piercing shells of this calibre has been already pointed out.

The following notes with regard to the acceptance of projectiles in the United States deserves notice:—

U.S. acceptance. Tests of armour-piercing projectiles.

The makers of armour-piercing projectiles naturally are left free to follow any course of manufacture they think gives the best results, but the Government stipulates for full information in chemical analysis and as to physical tests, although exceptions may be made in the

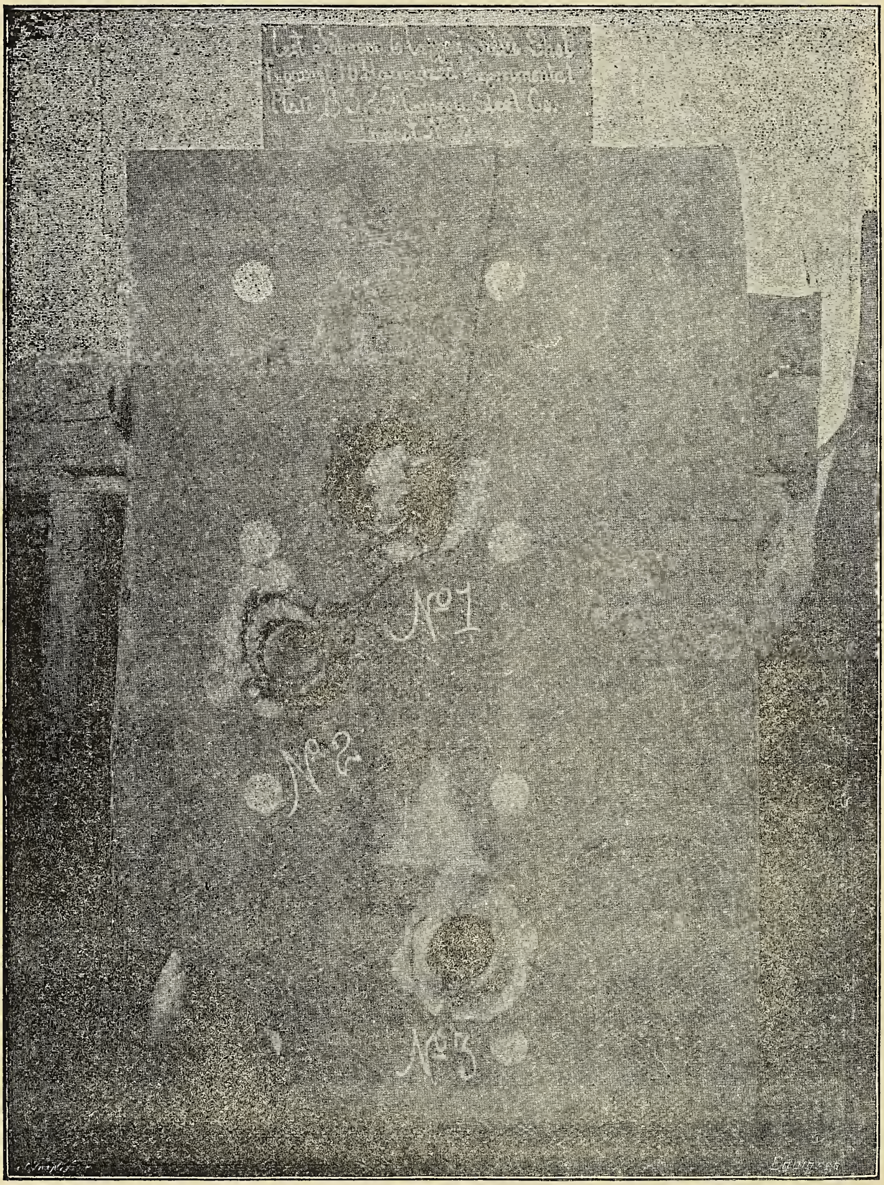


Fig. 27.

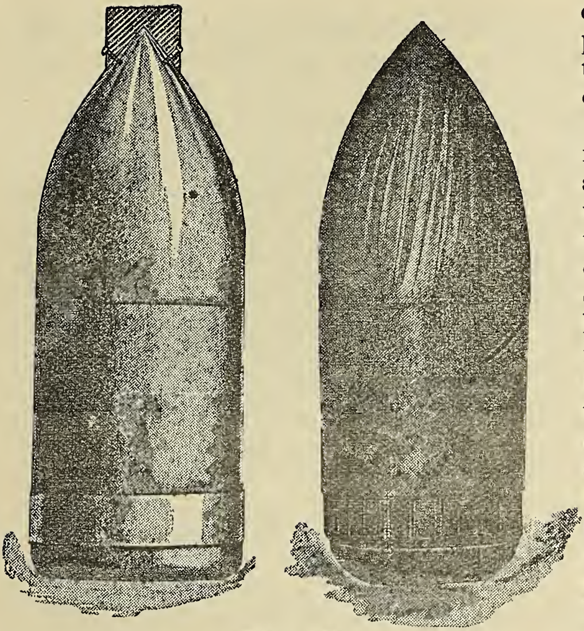


Fig. 28.

case of some secret process, when acceptance depends entirely on ballistic tests.

The Government furnish copper bands and gas checks. Armour-piercing projectiles are specified to be of forged and hardened steel, annealed at least 1200° Fah. after forging. Inspectors follow the projectile through each stage of manufacture. Before acceptance for ballistic trial, projectiles are tested for "initial strains bordering on rupture," by being brought to 40° Fah., plunged into water at from 180° to 212° Fah., and then again at 40° Fah. The interior of the projectile is also subjected to a hydraulic pressure of 500 lbs. to the square inch, and the development of holes, cracks, or unsoundness causes rejection.

For the ballistic test of armour-piercing shot, two projectiles are fired normally at 1,500 ft.-secs. velocity at a steel plate whose thickness is one and one-eighth times the calibre of the shot. If two out of three shots pass through plate and wood backing, without cracks or deformation, the lot is accepted. The Government reserve the right to make the following alternative test, namely, that two out of three shots shall pass through a hardened-faced plate one calibre thick, either whole or in fragments; the striking velocity to be about 1,900 ft.-secs. Armour-piercing shell are fired against a nickel-steel, oil-tempered and annealed armour plate 4½-in. thick for 8-in., and 5¾-in. for 10-in., and 7-in for 12-inch shells. With a striking velocity of about 900 ft.-secs. two out of three shells must pass through without being broken or materially deformed.

A.P. shells burst in store.

The importance of securing that the metal of projectiles is in a normal and not in a strained condition was brought out by the discovery, these three 4-in. A.P. shells had exploded in store in Devonport. That is to say the shells were found in fragments and the powder exploded, but the fragments were so little moved from their orginal position and so little harm was done that it was concluded that the shells had not been burst by their charges and had broken from spontaneous molecular action and that sufficient heat had been generated to burn the powder after rupture had begun. The explosion of powder released by a shell already ruptured is mild compared with that of a shell burst asunder by its charge, nevertheless it is an evil that calls for absolute prevention.

NOTES ON FORMULÆ PROPOSED BETWEEN 1893 AND 1898.

The unsatisfactory condition of formulæ for the calculation of perforation and fracture was noticed in 1893. Although no thoroughly practical investigation has been made, even on a small scale, so far as is known to the writer, yet some advance has been made in the way of arriving at working formulæ which may fairly answer the purpose, especially considering that fracture both of shot and plate greatly interferes with any accuracy such as might be arrived at if the conditions obtained that held good with wrought iron when shot retained their shape while cleaving a path through unfractured armour. Captain Tresidder has suggested a formula which he holds to be theoretically correct and while this is not conceded by the highest mathematical authorities, it has the remarkable fact to support it that if no variation occurred in the sectional density of projectiles, a well known formula obtained entirely independently by Krupp, becomes identical with that of Tresidder. The latter possesses the great advantage of being embodied in slide rules so that perforation can be read off instantly. To this probably is largely due the fact that it is now used officially in this country,

The following table gives a comparison of penetrations obtained by various formulæ for high velocities :—

Calibre in		Weight.	Velocity	Calculated perforation of Iron in Ins. on system of					$\frac{W}{d^3}$.
c.m.	inches.	lbs.	Ft.-Sec.	De Marre	Krupp	Tresidder	Fairbairn	Maitland	
24	9·45	330·7	2493	30·3	27·1	27·8	23·0	23·0	0·399
			2626	33·8	29·5	30·1	24·2	24·3	
			2756	35·4	31·4	32·3	25·4	25·3	
21	8·27	242·5	2493	26·0	25·4	25·5	21·0	21·0	0·429
			2628	28·1	27·2	27·4	22·1	22·2	
			2756	30·2	30·2	29·6	23·3	23·4	
16	6·30	101·4	2625	21·1	20·0	20·4	16·4	16·4	0·406
			2756	22·8	21·5	21·9	17·2	17·1	
			2953	25·3	23·9	24·4	18·5	18·7	
15	5·91	88·2	2625	20·4	19·5	19·7	15·8	15·8	0·427
			2756	22·0	21·0	21·2	16·6	16·7	
			2953	24·5	23·3	23·5	17·8	17·9	
14	5·51	70·5	2625	18·7	18·0	18·1	14·6	14·8	0·421
			2756	20·1	19·4	19·6	15·4	15·5	
			2953	22·3	21·5	21·7	16·5	16·6	
12	4·72	46·3	2625	16·1	15·9	15·9	12·8	12·9	0·440
			2756	17·4	17·1	17·1	13·5	13·6	
			2953	19·3	19·0	19·1	14·4	14·5	
			3281	22·6	22·3	22·4	16·0	16·2	

As pointed out in 1893, most formulæ agree closely for 1,580 f.s. striking velocity. Below that, Tresidder, Krupp and De Marre give lower results than Maitland and Fairbairn, and it seems wrong to adopt the former for such low velocities seeing that the latter were proved to be approximately correct and almost exhaustively in past years. As pointed out, however, Fairbairn and Maitland appear to be quite inapplicable to the case of the high velocities that have now come in. Consequently the sound plan appears to be to use Maitland or Fairbairn up to 1,580 f.s. and Tresidder above. Fig. 29 herewith shows the traces of the formulæ above mentioned obtained by connecting the results dotted in, so that the course suggested would adopt the curve dotted *A B X Z* and at *Z* shunt on to the Tresidder curve so marked. Practically, all important perforations occur at higher velocities than 1,580 f.s. and may be simply obtained by the Tresidder slide rule, by setting the shots' weight opposite the calibre and reading off the perforation for all velocities required. The scale happens to stand nearly or quite correct with the sliding shot home in its case for the 6-in. gun and 100 lb. shot.

Tresidder's formula may be written as follows :—

$$t^2 = \frac{w\,v^3}{d} \times \frac{1}{\log^{-1} 8{\cdot}8410}$$

Where t = the thickness of wrought iron in inches.
w = the weight of shot in lbs.
v = the striking velocity in feet-seconds.
d = the calibre of gun or diameter of shot in inches.

Krupp's formula brought to the same shape and using the same notation is

$$t^{\frac{4}{3}} = \frac{w\,v^2}{d^{\frac{5}{3}}} \times \frac{1}{\log^{-1} 5{\cdot}7776}$$

Now to compare these we may disregard all constant factors leaving the constant to be determined by practice as it were once for all.

Raising Krupp's formula to the power $\frac{3}{2}$ we get

$$t^2 = \frac{w^{\frac{3}{2}}\ v^3}{d^{\frac{5}{2}}} \times \text{constant terms.}$$

Now for shot of similar form the weight will be in proportion to the cube of the diameter, that is, for w we may substitute d^3 into some constant, or for one factor $w^{\frac{1}{2}}$, we may substitute $d^{\frac{3}{2}}$, thus

$$t_2 = \frac{d^{\frac{3}{2}} \times w\,v^3}{d^{\frac{3}{2}} \times d} \times \text{constant terms.}$$

which by cancelling $d^{\frac{3}{2}}$ becomes Tresidder's formula, viz.,

$$t^2 = \frac{w\,v^3}{d} \times \text{constant terms.}$$

Another curious instance of agreement of independent formulæ has occurred. Captain J. Castner, in the article of "Stahl und Eisen," of April 1st, 1896, gives a newly adopted formula of Krupp's for use with the newest and best plates with hardened faces. In continental units this is given as

$$p\,v^2 = 5800\,a\,E^2$$

where v is the striking velocity in metre seconds, p the weight of shot in kilos, a the diameter of the projectile in centimetres and E the thickness of plate in centimetres. Turning this into English units and transposing

$$t^2 = \frac{w\ v^2}{d} \left(\frac{(0{\cdot}3937)^3}{2{\cdot}2046 \times (3{\cdot}2809)^2 \times 5800}\right)$$

which worked out by logarithms for a single constant becomes

$$t^2 = \frac{w\ v^2}{d} \times \frac{1}{\log^{-1}\ 6{\cdot}3532}$$

or substituting d^3 into a constant, for w and cancelling,

$$\begin{array}{rl} t^2 = & d^2\ v^2 \times \text{constant} \\ \text{or } t = & d\ \ v \ \times \text{constant} \end{array}$$

which is the equation of the old "Rule of Thumb," the constant, however, is nearly $\frac{1}{2000}$ instead of $\frac{1}{1000}$, that is to say, the thickness of best plate perforated is about one calibre for each 2,000 f.s. velocity. Speaking roughly then, the Rule of Thumb is thus advocated as the formula for hard steel for shot of the same form proportions, except that every thousand feet gives half a calibre perforation instead of one calibre as in wrought iron.

As mentioned before, our 6-in. plates are called upon to defeat 6-in. shot with 1,960 f.s. velocity. For the rule just mentioned to be correct the shot with 40 f.s. more velocity should match the plate which probably they would not do, but the rule may appear to be fairly near to the truth.

To save time and trouble to anyone working out the results of experiments the following example is given, being the first round fired at Vickers thick plate made on Krupp's process already mentioned.

Dimensions of plate 10 ft. × 7 ft. × $11\frac{11}{16}$ in.
Calibre of gun or shots' diameter = 12 in. and w = 721·5 lbs.
Striking velocity, v = 1861.

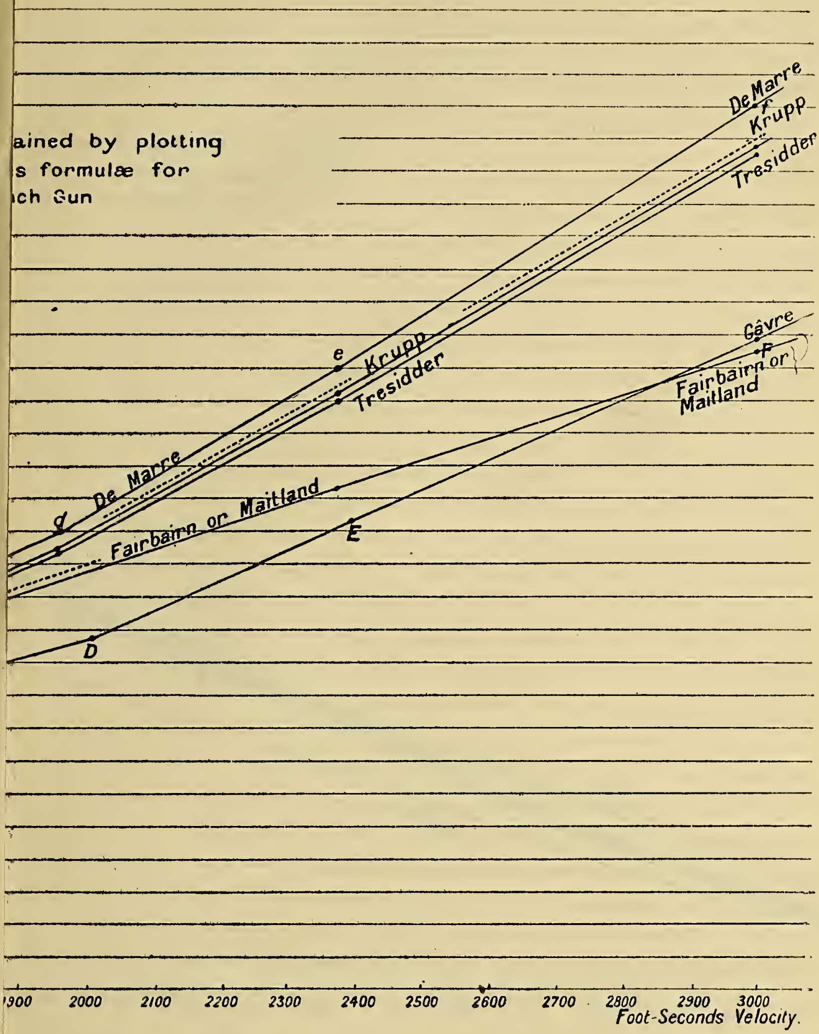
For perforation tests Tresidder's formula is $t = \sqrt{\dfrac{w\ v^3}{d} \times \dfrac{1}{\log\ ^{1}8{\cdot}8410}}$

where t = thickness of wrought iron in inches.
w = weight of shot in lbs.
v = striking velocity in f.s.
d = calibre or diameter in Ins.

$$\begin{array}{rl} 3 \log v\ (1861) = \left\{\begin{array}{l} 3{\cdot}2697 \\ 3{\cdot}2697 \\ 3{\cdot}2697 \end{array}\right. & \\ \log w\ (721{\cdot}5) = & 2{\cdot}8582 \\ \hline & 12{\cdot}6673 \\ & 9{\cdot}9202 \\ \hline 2 & \underline{|2{\cdot}7471} \\ t = \underline{23.63} \text{ in.} & 1{\cdot}3736 \\ \log T \text{ thickness of plate in in. } (11\frac{11}{16}) & 1{\cdot}0675 \\ \hline \frac{t}{T} = \underline{2.023}\ \ldots & {}^{0}{\cdot}3061 \end{array}$$

$$\begin{array}{rl} \log d\ (12) = & 1{\cdot}0792 \\ \left.\begin{array}{c}\text{constant factor in} \\ \text{denominator}\end{array}\right\} & 8{\cdot}8410 \\ \hline & 9{\cdot}9202 \end{array}$$

$\frac{t}{T}$ is the relation of the actual thickness of the plate to the calculated wrought iron that would be perforated, sometimes called the plate's "figure of merit," when it is a match for the plate.



[To face page 556.

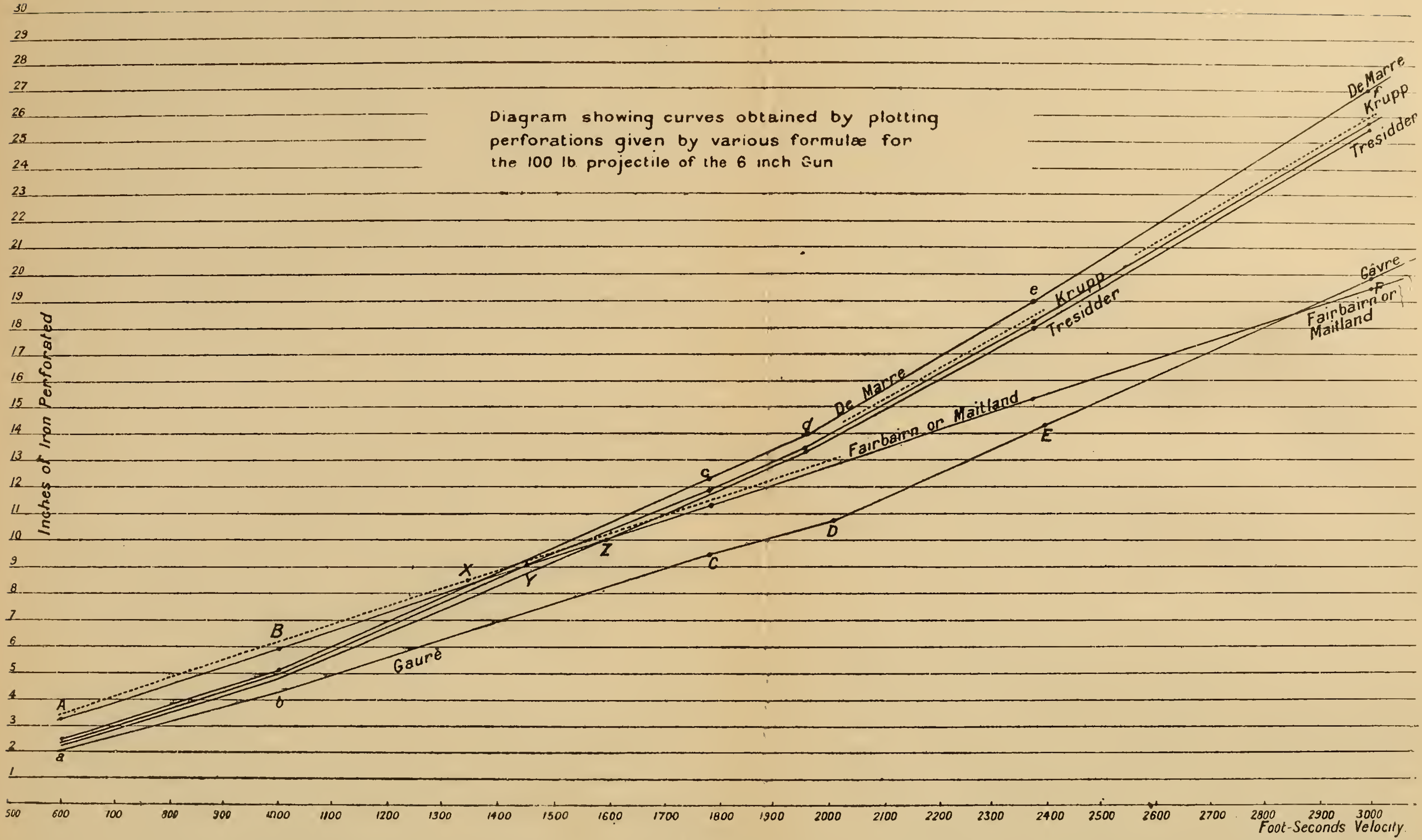


Diagram showing curves obtained by plotting perforations given by various formulæ for the 100 lb. projectile of the 6 inch Gun

Fig. 29.

To face page 556.

If Tresidder's slide rule be used, *12* (the d) is set to about 721·5 (w), and opposite to 1861 will be found 23·6 (for t).

For shock or fracture strain there is nothing to guide us beyond the energy per ton of plate and the relation of the diameter of the shot to the width of the plate respectively.

In the above case this will be as follows:—

$$W \text{ (weight of plate)} = \frac{10 \text{ ft.} \times 7 \text{ ft.} \times 11\tfrac{11}{16}}{12} \times \log^{-1} \bar{1}\cdot 3422$$

That is the dimensions of the plate in cubic feet multiplied by the factor for the weight of a cubic foot of steel in tons.

$$\begin{array}{ll} \log (10 \times 7) & = 1\cdot 8451 \\ \log 187 & = 2\cdot 2718 \\ \text{log for steel} & = \bar{1}\cdot 3422 \\ \hline & 3\cdot 4591 \\ \log (12 \times 16) & 2\cdot 2833 \\ \hline W = \underline{14\cdot 99} \text{ tons} & 1\cdot 1758 \end{array}$$

$$\begin{array}{ll} & \text{For energy.} \\ 2 \log v \,(1861) = & \begin{cases} 3\cdot 2697 \\ 3\cdot 2697 \end{cases} \\ \log W \,(721.5) = & 2\cdot 8582 \\ \hline & 9\cdot 3976 \\ \log (g \times 2240) & 5\cdot 1590 \\ \hline E = 17320 & 4\cdot 2386 \\ \log W \,(14.99) & 1\cdot 1758 \\ \hline \end{array}$$

$$\text{Shock or energy per ton of plate } \frac{E}{W} = 1155 \qquad 3\cdot 0628$$

The diameter of the shot is $\frac{1}{7}$ the width of the plate which is a function of the fracture strain.

(To be Continued.)

MARCHING THROUGH JUNGLE ACROSS INDIA.

BY

MAJOR P. H. ENTHOVEN, R.A.

MAJOR COXHEAD last year gave some experiences of marching in India along roads. It has been suggested that some details of the march of the 55th Field battery from Ahmedabad to Saugor might be of interest, as nearly three-quarters of the 500 miles traversed lay over rough tracks or across country.

The battery did not start till the end of January—late in the season for a move across Central India—and we had already marched to Rajkot and back, a distance of 300 miles. There were no particular features nor difficulties on that road and the expedition can be dismissed in a few words.

March to Rajkot.

Orders were received on 2nd November, only a week before we had to leave, though the climate of Ahmedabad till the middle of October does not lend itself to conditioning horses. The roads were at times moderately good; but for five days, of the fourteen occupied by the march, tracks only were available. The country is mostly flat and uninteresting, but sport was good, duck, snipe and an occasional buck overloading the larder.

Arriving at Rajkot, we fired innumerable salutes; the day H.E. Lord Sandhurst held the Durbar for the reception of the chiefs of Kathiawar, 364 rounds were disposed of.

Six clear days after our arrival we were again *en route* and reached Ahmedabad on 14th December. We added several cobras to our bag on the way back and enjoyed a week-end's sport with the Thakor Sahib of Sayela.

We had to await the arrival of the 34th Field Battery from Meerut to exchange native establishments, but Christmas and a couple of inspections filled in the six weeks interval till 27th January when the battery moved into camp.

Line gear.

Line gear is still less durable here than at home and in three days a complete new set of mauls, both heads and helves, were entirely destroyed. Others were made up by the wheeler which lasted ten times as long, but they were not of "sealed" pattern.

Coffee shop

We were more fortunate than "B" Battery in the Coffee Shop contractor. It was run by one Hassan, assisted by his brother Cassim, and never failed us. One portion was in camp and remained as an early coffee stall, another portion was ready at the half-way house (best known as "coffee shop,") and a third went a-head every evening with the battery cooks and was open by the time we reached the new camping ground next morning.

Hassan also made a first class interpreter and provided the milk which was guaranteed boiled. We never caught him tripping.

Officers' mess. The mess was run on the usual lines, and our butler deserves the greatest credit for the way in which he brought rickety carts over the rockiest of roads night after night, hardly ever failing to have breakfast ready and drinks cooled by the time they were wanted.

Game. Amongst other game we saw a few panther, but we failed to shoot any.

We had three medical officers attached—one at a time—all capital sportsmen.

Stable management. Going to Rajkot, a veterinary officer accompanied us as well but on the longer march we had to do without him. In his absence no serious cases occurred, even colic was very rare as the horses subject to it were all known and treated accordingly. Extra feed was given, but, as the quantities necessary naturally vary under different circumstances, it is useless to give details. Most batteries doubtless carry canvas water troughs; it is difficult to overestimate their importance; sent on overnight they were ready for watering the horses at the end of the day's march. Sun jhules were also very efficient in various ways.

"Chits." The usual certificate asked for by the local headman should be given when marching off, or sent back, thus ensuring a report as to whether all is correct.

The question of paying the transport drivers is no easy one. Sometimes all the carts can not be re-placed daily and some have to be taken on further; one thing is certain, if a sharp eye is not kept on the pay, the drivers will receive a greatly modified portion of the official wage. Though marching across country no maps were provided and we had, to a large extent, to trust to guides who on various occasions failed. **Route book** A route book twenty-two years old gave a great deal of incorrect information and could not even be trusted when selecting a watering place. The daily distances were seldom accurately given and generally turned out longer than was expected. "Good roads" proved bad tracks, and *per contra,* once or twice "rough cart tracks" were found to be metalled roads.

Route. The route was *via* Godhra, Dohad, Mhow, Sehore, Bhopal and Bhilsa. The general direction was east, Mhow being the most southerly point.

1st week. On 31st January we started on our fifty days march and plunged into deep sand barely a quarter of a mile from barracks. The going for the first two days was so bad that the byle gharries (changed daily) could not catch us up and the third day out we had to halt to wait the arrival of kit. Taken all round, the 1st February was about the worst day's march we had. An intelligent guide skilfully led us by an alternative road to the one he had pointed out to the "coffee

Horses.

shop" over night, the going was very deep; there were two rivers to ford and the temperature was high, reaching 92° in the tents that afternoon. The Rajkot march undoubtedly stood us in good stead and saved many horses from being knocked out of time. When we left Ahmedabad the infirmary had claimed no victims and over 110 horses were all on parade. Four remounts that had joined within the previous ten days were doing half-time in the gun teams in a week.

Men.

Though up to strength in horses we were 25% below the establishment of men, a large number having been invalided. So short-handed were we, that at times corporals were driving in the teams, bombardiers seldom had a day off and all ex-drivers took their turn.

Cotton soil.

On the 4th and 5th days the going was still heavy, along narrow winding lanes which we occasionally escaped from by cutting our way through cactus hedges across country. Open maidan was reached on 5th February, but the soil was deep black-cotton and the ruts in the track almost impassable. To avoid them we serpentined between the holes that broke up the surface of the country but were often pounded and had to make the best of the track. Twelve miles of this was an ample day's work and we were glad to find a shady camp at Thasra. By making judicious use of the trees most of the horses were provided with shade; so far they had enjoyed little protection.

We had now begun to rise from the few feet Ahmedabad is above sea level and the temperature had decreased; 55° to 82° were the limits that day.

Railways.

Here too the railway was first encountered and we were in touch of it for a week. Our connection with railroads was very symmetrical, five days without, a week within touch. Then two intervals of about ten days each separated by the M.R.R. at Mhow. Once more a week on and a week off. This tried the carrying powers of the canteen highly but English beer never failed.

Early marching.

We left Thasra next day (Sunday) at 4.55 a.m. by the light of the moon. I believe this is not usually practised but we certainly found it answer admirably. We moved off almost without exception before daylight or, when the path was very bad, at the first streaks of dawn. Sunrise was the coolest part of the day and by being on the move then man and beast avoided chills and utilized the most suitable temperature for marching. After a few days we were able to move off within half-an-hour of reveille in spite of the large tents used. The new camping ground was generally reached long before the hottest part of the day and work was nearly done by the time the tents came in or were required. Breakfasts were eaten before stables and evening stable hour was moderately late. This seemed to suit all ranks and the horses certainly did not suffer either in condition or from galls. Marching order was carried, an observation which will appear superfluous to many; none will welcome the introduction of pole draught more heartily than the shaft horse with the nodding pile of blankets on his pad.

2nd week.

The track to Timba and Godhra was mostly sandy and heavy. At the latter camp, the Sergeant-Major shot some fine duck, "wild" by order of the Mamlatdar, but "domestic" according to the owner.

On the 8th we struck a road for the first time, which passed through thick jungle and rose gradually throughout the day. The camp was at the edge of a tank and we shot cotton teal from our tent doors at intervals during the afternoon. Next day we entered the State of Bavia and during the three days we were in it were exceedingly well looked after; indeed, except in Gwalior, we found all arrangements distinctly better in native states than in British territory. Piplod was remarkable for a wet afternoon, a regular soaking for everyone, hardly expected so late as the middle of February.

3rd week.

Five days of the above-mentioned road took us to Dohad, where we enjoyed our first halt for eleven days. Here we left both roads and railways and the succeeding seven marches were particularly rough. The country became bleak, rocky and hilly, and many deep nullahs were crossed.

At Para camp several men mistook castor-oil berries for nuts and in due course suffered severely.

Ascent of the ghauts.

On the 17th, (after climbing the Tilah Ghaut—where in one place a rough track rises 300 feet in little more than half a mile) we landed on the Central India plateau on which we remained for the rest of our journey. Shaft draught made the ruts, along which we had frequently to travel, extremely awkward, and poles will certainly be a great improvement from this point of view.

Hard ground.

Amjhera was remarkable for the adamantine ground; wooden pegs crumpled like paper and without the iron peg each subdivision carried, the tents could scarcely have been pitched.

Dhar.

On arriving at Dhar we found that the obsolete route book had deprived us of three days on a first-class road, but we were able to use it into Mhow. Traces of the Mutiny had been seen at Bhopawad, two marches back, and the breach in Dhar fort, which the battery had assisted to make in '57, is still left. The Maharajah paid us a visit and specially requested us to perform sword exercise for him.

Mhow.

Double marches to Mhow along the excellent road gave a clear day there and "I" Battery and the 22nd Field entertained the battery royally.

4th week.

We had the greatest difficulty in obtaining transport at Mhow, and the cantonment magistrate also failed to provide wood and milk at the half-way house; this was the only time we had to go without refreshments during either this or the Rajkot march. His guides also had no notion of the route and led us five miles out of our way, viz., 18½ miles. The ground too, was more than rough in many places and the day particularly hot. The rear-guard had eighteen hours continuous work.

Luckily, the next day (the 27th,) was Sunday and a halt, for the following march was nearly as stiff, it was 16½ miles and lay through jungly country over a bad, rough track, and no trotting was possible.

Hatka Pipla was remarkable for the high temperature of 100° and the extraction of a tooth with instruments constructed for amputating limbs. Government does not recognize tooth-ache in camp.

A lovely glade crossed next morning was the most beautiful bit of jungle we saw during the march, and the night was memorable for the extreme cold—43°.

On the 4th March we reached Ashta, a very ancient town which we explored; it contained some buildings supposed to date from A.D. 100 and various side and fire-arms of comparative equal age. Here too, we discovered that a good road might have been taken for the whole eighty miles from Mhow (*via* Indore and Dewas) but our Route had directed differently. **5th week.**

For the next four marches we had a made high road running through flat cultivated country till approaching Bhopal where there is a very small ghaut. At Sehore we found the best camping ground of any; the Bhopal battalion and the Political Agent both entertained us and at Bhopal, two days later, the latter was again our host and escorted us over the town. The Victoria Lancers (Bhopal Imperial Service) were most courteous and I was glad next day to have the opportunity of seeing them on parade and in their lines. **Bhopal.**

The next march was the shortest we had and was completed under an hour, though once more off a made road. We did not find metal again till almost within sight of Saugor. On the 11th we crossed the Ballum Ghaut and camped at Ganj in a regular amphitheatre of hills. A temple in the rock above the camp bore an inscription showing that the 44th Field Battery had passed in 1893. **6th week.**

From Bhilsa onwards we found many interesting temples and ruins, most of which Captain Knox photographed. Sanchi is well known, but Goraspur is equally worth visiting. A fine ruin stood within the camp and also the grave of a Sergeant-Major Snow, of the 72nd Native Infantry, who died there in 1837.

The arrangements here were very bad, we had great difficulty in obtaining supplies and the conduct of the officials was all it should not have been, Fifty duck as the result of a fifteen minutes shoot at a neighbouring tank was a useful bag.

The track after this was frequently very rough and many were the carts wrecked. Our Mess on one occasion was found a few miles out though, as usual, it had started about 11 the previous night. The bullocks were poor and the vehicles worse. **7th week.**

Ratgard, reached on 18th, was once a town of importance and the ruined fortress and arsenal show unmistakable signs of its former greatness. A road at one time ran to Saugor, though nothing of it is now left but bridges in partial repair.

At Bapyle we pitched our last camp and held the final sing-song, but all were sorry that the march was at an end. The afternoons had certainly become uncomfortably warm; at Ratgard the thermometer had reached 106°. Arrangements had, therefore, been made to push on and we reached Saugor on 20th March, two days before we were due.

During the winter we had marched, altogether, for eleven weeks and covered a total distance of 800 miles.

PRECIS

AND

TRANSLATION.

REVUE MILITAIRE DE L'ETRANGER, JULY, 1898.

"COMPETITION OF WAR-DOGS."

BY

COLONEL J. H. G. BROWNE, *late* R.A.

ON the 12th of June a competition of war-dogs took place at Oels, in Prussian Silesia, on the occasion of a dog show arranged by a society of civilians. According to the newspaper *La Post*, from which this account is taken, the Emperor continued to show the interest which he takes in this branch of military organization by defraying the expense of the competition, and by requiring a special report of the result. It took place in very fine weather in the presence of Colonel von Arnim, the Inspector of "Chasseurs." The judges were composed of officers of different battalions of "Chasseurs." The trials included being led in leash, fetching, carrying despatches for distances of two or three miles, with obstacles for the old dogs, without obstacles for the young ones, and the return of the dogs to the places from which they started, following on the trail of the master, behaviour as watch-dogs, and, lastly, searching for the wounded and indicating the success of the search by giving tongue. The ground chosen intentionally presented great difficulties. In order to carry their despatches, the dogs had to traverse marshy bottoms, prairies covered with high and humid vegetation, and populous villages, in which music and dancing was going on, without allowing themselves to be diverted from their mission. On the average they traversed a kilometre in 3½ minutes (a speed of about ten miles an hour).

Of the twenty-three dogs which took part in this competition, prizes were given to *five*. The first prize was carried off by the dog of the 4th company of the 5th battalion of "Chasseurs," a yellow-coated sheep-dog, excellent in every respect. The other prizes and some supplementary awards, with the diplomas of honour for the soldiers who acted as trainers, were carried off by dogs attached to other battalions of "Chasseurs."

The first prize awarded to the soldier in charge of the dog consisted of a carbine and of sixty marks. The society had given about 200 marks to be divided amongst the five prizes.

Next year another similar competition is to take place at Hirschberg.

LIBRARY
DEC 12 1898
PATENT OFFICE

THE SERVICES OF LIEUT.-COLONEL FRANCIS DOWNMAN, R.A., IN FRANCE, NORTH AMERICA, AND THE WEST INDIES BETWEEN THE YEARS 1758 AND 1784.

EDITED BY

COLONEL F. A. WHINYATES, *late* R.H.A.

PART III.

The French capture the Islands of St. Vincent and the Grenadines. Manœuvres of, and actions between, the English and French fleets.

CHAPTER IV.

June 19th, 1779.—We are just informed that the French have landed some troops under cover of three frigates in the Isle of St. Vincent. Governor Morris has written to General Grant for some assistance, but how the devil is assistance to get to him when Byron has not left us even an armed boat? When the Admiral returns he may get succour but not before, and then most likely it will be too late to save the island, for if the French have landed but a very small number of men, yet assisted by the Caribbees, whom I am told amount to 1,100 men and are armed and supplied with ammunition by the French, it will not be an easy matter for us to take it.

June 22nd.—This morning a French frigate passed us in going from Martinique to St. Vincent, and on the 23rd, early in the morning, we saw the same vessel returning towards Martinique. We now begin to fear not only for St. Vincent but the Grenadines also. We cannot learn anything of M. Byron, only that he is conveying the West Indian fleet to the latitude 24° north, so that d'Estaing can have nothing to fear, for this week or ten days, in which time, if he plays his part with spirit and vigour, he will cut out an entertainment for our army and navy.

June 24th.—We are now informed for a certainty that St. Vincent is taken, the rascality of the Governor and a Colonel Etherington having accomplished what the French when they landed had not the least thought of. They landed not 250 men, irregulars, ragamuffins, anything, from three small ships and remarkably enough all English, the *Lively*, the *Weasel* and a Bristol-man, their only intention we learn was to spirit up the Caribbees against the English, and on their landing, about 400 of these came down from their woods, but almost immediately returned, being dissatisfied at something or other. The enemy were scarcely on shore when the above poltroon of a scandalous Colonel, though commanding 370 English soldiers, sent to the Frenchman to know what terms he would grant. A question so unexpected surprised the French exceedingly, but as the island seemed determined to surrender, they allowed our pusillanimous Governor and Colonel most things they demanded, except some matter relating to the Caribbees.

July 1st, 1779.—As Byron came in sight this morning to the north, 14 sail of French ships were in sight to leeward. He was told of them, he saw them, yet never went after them; astonishingly strange! Byron is at length come back, he hove in sight early in the morning to windward, and soon after the whole fleet came to anchor, some in the Gros Ilot, and some in the Choc bay. This has been a most dismal day, incessant rain, violent gusts of wind, and loud claps of thunder. In the afternoon all the men-of-war came and anchored opposite the Careenage. A French fleet of 15 or 16 sail were also in sight to leeward. Byron never stirred an inch after them.

The army, except the three regiments and artillery ordered to stay, have orders to embark immediately, the whole are in a bustle and confusion.

July 2nd.—Army, baggage, horses, asses, goats, women and children embarking, all bustle, all noise. St. Vincent must be re-taken.

July 3rd.—The fleet are under way and going towards the island; good luck go with them. D'Estaing they say is joined by six ships of the line, eight frigates, and 6,000 or 7,000 men—poor old England! I wish Byron well over the bridge. I this day took possession of my quarters on the Morne and commenced Commandant.

July 4th.—Getting stores, &c., from the Careenage to the Morne. Taken ill with fever and violent pains in breast and bowels.

July 5th.—We are in a great bustle on the hill, and are not without our doubts of d'Estaing paying us a visit. Getting our stores from the town as fast as possible.

July 6th.—We are told our fleet have got a thrashing, and that d'Estaing has gone to the Grenadines—very fine indeed! Vile Byron! Unfortunate John Bull!

July 7th.—Brought the two 5½-inch howitzers from town to the Morne this morning with 52 negroes and our own men. Byron's last trip of five or six weeks is the cause of the loss of St. Vincent and the Grenadines, and the defeat of his own fleet, because it was in his own power had he acted right to prevent d'Estaing being joined by M. de la Motte Piquet; had he remained to windward of Martinique the islands could not have been lost, and he might have interrupted the French re-inforcement. In all that long cruise he took not a single vessel, nor did he even see the West Indian fleet after they left St. Kitts, where he lay eight days inactive with his whole fleet, though he went with an intention to escort them to a certain latitude.

July 10th.—We are informed this morning by a sloop that Admiral Byron is beaten, and that the Grenadines are taken. The master says he saw the action and that they were engaged six hours. This is the direful consequence of Mr. Byron's last trip. He has lost St. Vincent, the Grenadines and perhaps many of the transports. The French fleet, considerably larger than his (as they were just joined by the 14 above mentioned) were drawn up in line of battle near the Grenadines.

July 17th.—A fleet of very large ships, upwards of 30, passed this day to leeward towards Martinique. We are certain it is the French fleet. Who knows what is become of ours—we have heard nothing from them, but by French and others we are assured they have been beaten by d'Estaing. Of course they are dispersed and gone nobody knows whither. We are in daily expectation of a visit from Martinique and are making every preparation in our power to receive the French.

July 26th.—A French gazette from Martinique, mentions the takings of the Grenadines the —— instant, with the loss of about 100 men killed and wounded, also the attack of the British fleet on the French wherein they claim the victory, but at the cost of 1,000 men killed and wounded. We are told only eight of the British ships were engaged, the French having 24 in the action. Admiral Barrington behaved gallantly and is wounded. We cannot hear a syllable of news of our fleet, suppose they have gone to Antigua.

August 5th, 1779.—The *Maidstone* frigate and the *Surprise* sloop of war arrived this morning; they left St. Kitts on Saturday last and bring us the following information. That part of our fleet has been rather roughly handled by the French one, owing to that part bearing the chief of the fire from the whole French fleet. Our fleet did not get into action all together, as it was necessary to protect our transports. The enemy notwithstanding their superiority (for they had 26 or 27 sail of the line and a vast number of frigates), gave way when our ships attacked them, but they afterwards made a double as if to get at our transports. This manœuvre obliged Byron to alter his situation; in doing this and protecting his transports his force was much lessened, and some confusion or mistakes seem to have followed. Those of our ships that were hotly engaged were not supported and two or three of them suffered a great deal. The French fleet re-fitted at the Grenadines, and our fleet, except the *Lion* which is missing, went to St. Kitts. The whole French fleet, while ours was lying at anchor at St. Kitts, bore down upon them until within half a cannon shot, then hauled their wind and went away and have not since been seen. Perhaps they are gone to Jamaica in conjunction with the Spaniards; perhaps they are gone to some other of our islands. Their intention was to have taken St. Kitts if Byron had not been there; they have

7,000 troops on board their fleet. The English fleet has been joined by the *Vengeance* of 74, two ships of 50 guns, a frigate or two, and two bomb ketches. The regiments that went from here are divided between St. Kitts and Antigua. The Artillery and stores from all our ships are landed at St. Kitts and will be dispersed for the protection of those islands.

Lord Macartney, governor of the Grenadines behaved exceedingly well; he is sent a prisoner to France.

Admiral Barrington went on July 15th to England in the *Ariadne*, some say in disgust, others say on extraordinary business. The whole business is extraordinary. Faults there are, and not a few. Who is right, or who has done amiss may soon be discovered, I wish some of their caputs may not be in danger.

A transport, the *Savile* with Colonel Ogilvie and 150 men of the 4th regiment is taken, which is the only one of our transports that is missing. General Grant is gone to England to give an account of his stewardship.

August 20th.—Byron and his fleet have arrived at Barbadoes. d'Estaing is gone, but no one here knows whither. Byron is gone to England.

September 1st, 1779.—The troops are exceedingly sickly and die away fast. Since General Grant went away, we have lost in all Lieut. Walker and six of the artillery, and upwards of 30 are sick. Since the first part of the army landed on the island (?) officers and rank and file are dead, and a vast number of women and children. The Comte d'Estaing, we are informed, is gone to America. Our fleet are cruising somewhere or other. Admiral Parker has taken 14 St. Domingomen. The *Sphinx*, with the bomb and tender sailed from Barbadoes; a French frigate left Martinique the same day, and in a few days afterwards we were told the *Sphinx* and tender were taken and carried into Martinique. This is the second time poor Garstin has lost all his baggage.

October 17th, 1779.—I was taken exceedingly ill, and in a few days was given over, however, I disappointed the doctors, and recovered just when they thought me going and boards were asked about for my coffin.

November 21st.—Just able to get on a horse.

Extremely busy on the hill in finishing our redoubts and getting everything ready for an attack which we have expected for some time. The Marquis de Bouillé, Governor of Martinique did certainly collect all the troops he could with an intention to pay us a visit, but something prevented him.

November 28th.—Five men-of-war and a frigate of Admiral Parker's fleet came to anchor in Choc Bay to wood and water. We are informed that Comte d'Estaing has been beaten off from Charlestown, with considerable loss of men, and himself wounded in two places, but that his fleet had taken or destroyed four of our ships.

December 4th.—Admiral Parker and the remainder of his fleet came here and anchored in the Gros Ilot. We are told d'Estaing's fleet has got into Martinique, although ours has been on the look out for him for some time, but as usual cruising in the wrong place.

December 17th.—This morning a fleet of 20 or 30 sail appeared in sight to windward of Martinique. We fired a gun from our hill and hoisted the colour up and down 30 times to let our fleet know of it, which directly afterwards made signal for all boats to be put under way. The fleet above mentioned is a French one and is now going close along the Martinique shore to get into Fort Royal. Our fleet of 18 sail is crowding across to intercept them. At about one o'clock the headmost of ours fired several shot at one of the French ships, but it being hazy, we cannot distinguish objects clearly. At about half past one several of our ships seemed to be amongst the French and fired a good deal and from what we can discern at the distance, several of the French ships must be taken. If our fleet had been out one hour sooner the whole of them probably would have fallen into our hands. In the evening two ships were seen on fire on the shore of Martinique, which burnt very fiercely the greatest part of the night.

December 19th.—A very fine clear morning, we can see our fleet at and near the entrance of Fort Royal harbour. Their number is augmented to 25 or 26 sail, so that they have taken several prizes. This morning two more ships were set on fire on the shore of Martinique. The weather very fine and clear all day. Two prizes came to anchor in the Careenage and several others with two men-of-war went to the Gros Ilot. The remainder of our fleet are near Fort Royal harbour.

December 20th.—Very fine and calm morning. Our fleet are going to windward except two or three ships that are attending the prizes. We cannot yet learn what number have been taken or destroyed. One of the men-of-war at the Gros Ilot, the *Conqueror,* fired 45 half-minute guns this morning on the death of her Captain, Griffiths, who was killed on the 18th, when he was in Fort Royal harbour. His ship was considerably the headmost of our fleet and made a frigate and seven ships strike to him. Three French men-of-war went down the harbour, seeing him alone, and began a heavy fire upon him, but at a great distance, which he returned and continued the engagement with them all for near two hours before any of the other ships got to his assistance. The shot that took Griffiths killed also three other men which were our total loss—very unfortunate—he was a brave officer. Nine ships of the French are taken and five burnt. A French 20 gun ship-of-war is among the number, and a frigate did strike to the *Conqueror,* but when the French men-of-war engaged the latter, the frigate and some others got up the harbour away from her.

December 21st.—The prizes are all at anchor in the Gros Ilot. A division of our fleet of 14 ships under Admiral Rowley are cruising to windward, and another to leeward, under Commodore Collingwood. Admiral Parker with the others in the Gros Ilot are going to anchor. This day remarkably fine and very hot. About half past three this afternoon I saluted the Admiral with 13 guns just as he came to anchor. He did not return it till the next morning at sunrise, the reason of this delay being that he did not hear our guns, as he was distant 10 miles to leeward.

December 28th.—A fine day, showery towards night. This afternoon fired two guns and hoisted a flag to inform Admiral Parker of our seeing a fleet to windward of Martinique. He did not seem to take any notice of it. This night very rainy and windy in squalls.

December 31st.—A very fine day. We can discover six or seven sail to leeward of the island.

January 1st, 1780.—A very smart shock of an earthquake this evening about 8 o'clock made the house shake very much. The ships seen yesterday, prove to be Admiral Rowley with three French frigates and two sloops all of which he has taken since he went out; they are the three we saw to leeward on the 21st, one of them is *La Fortune* of 42 guns, the other *La Blanche* of 32 guns, and the third is the new *Ellis* privateer of Bristol, copper bottomed, 28 guns, which had been taken by the enemy and made a frigate of. These three ships had been carrying the few remaining troops (after the affair at Charlestown) to the Grenadines. We saluted Admiral Rowley as he passed, which he returned. We are informed that d'Estaing lost four frigates on the bar of Charlestown, and upwards of 1,000 of his troops killed in the attack he made on the English. May he ever meet with the like misfortunes when he takes the part of rebels.

I sent the following letters and amounts the 10th December, 1779, by the packet:—

1. A letter to Cox and Mair containing three bills for £70, £50, and £40. A letter to Colonel Farrington, and an account of late Lieutenant Walker's effects.
2. Letter to the Board (duplicate) about Lieutenant Edwards.
3. Letter to the Board with medicine account.
4. Muster rolls and pay list for my detachment for Sept., Oct., Nov., and Dec., 1779.
5. Letters to Mrs. Hunter, Mrs. D., and Miss Day, with order on my agent for £10.
6. Letter to Donaldson.

January 2nd, 1780.—A fine clear day. Two of the French prizes are at anchor in the Gros Ilot, the other one is in tow of one of our men-of-war, having lost her mizzen-mast in attempting to escape. It is by no means an unpleasant prospect that we now enjoy from our mountain, a number of prizes at anchor in our harbour and three very fine frigates going in. Admiral Parker makes use of his ships, which Byron never did. Parker has taken nine or ten St. Domingomen, he has also taken and destroyed 15 ships within our sight and he has taken three frigates.

January 3rd.—This morning very fine and clear. We can see six or seven sail of ships to leeward of Fort Royal harbour. We fired two guns from our hill, and hoisted the colours to inform the Admiral, who, soon after, got under way with his ships. Commodore Collingwood with his division came down from the windward and joined Admiral Parker; the whole, consisting of 16 sail are at 12 o'clock standing towards Fort Royal. In the evening we could perceive that some of them stood into the harbour. When the Admiral left the Gros Ilot he ordered all the prizes down to the Careenage, where they soon arrived and anchored off the mouth of it, not a very grateful sight to the Frenchmen who are constantly going in and out in their canoes to and from the town. A remarkably fine night.

January 4th.—A most beautiful morning. The island of Martinique is exceedingly free from clouds and fogs, and the houses are distinguishable with the naked eye. Our fleet are lying off the mouth of Fort Royal harbour, seemingly becalmed; late in the evening it returned to anchor in the Gros Ilot.

January 5th.—As fine a morning as the last and Martinique equally clear. There is not a French ship of war in Fort Royal harbour.

January 6th.—Remarkably fine day. All the prizes left the Careenage and came to in the Choc Bay.

January 7th.—A clear delightful day. Admirals Parker and Rowley, and Commodore Collingwood dined on the Morne. The Admiral set sail with all his prizes for Antigua, and intends to look after M. de la Motte Piquet and his fleet. Nine ships of the line under Commodore Collingwood are left to protect us.

January 10th.—A fine day but hazy. Martinique is not to be seen, and our prospect is much abridged by the thickness of the air, but the days are cool and pleasant notwithstanding. In the evening a smart shower of rain fell, but it did not continue long.

January 12th.—Commodore Collingwood got under way from Choc Bay and continued off and on the shore all day. He was joined by a large ship from the windward. A good deal of rain this day and during the night.

January 13th.—A fine clear morning. Our Commodore and his fleet are off Fort Royal harbour; in the afternoon they returned to St. Lucia, but did not come to anchor. This day has been remarkably fine, the night equally so.

January 14th.—The fleet is separated and a good way to leeward. We imagine this is owing to the currents, which are, on this coast, very strong and very variable. One day setting to the northward, the next night perhaps to the southward, and in a few hours to the westward and north-west, and if the breeze is not pretty strong, ships are very soon carried a considerable distance, whichever way the current sets.

January 15th.—A fine day. Our fleet are attempting to get to windward, but go on but slowly. I this day received a very extraordinary letter of no older date than on the 14th December, 1764, directed to Lieut. D. at New York. On the first page are written a few lines from my late aunt Price and a few from my friend Doctor Hicks. On the 2nd and 3rd is a long letter from the Doctor's sister for whom I had a sort of *penchant*. This letter was entrusted to a friend, who promised to take a great deal of care of it. I think he performed that part of his promise for the letter is really in high preservation, considering it is only fifteen years since it was written.

This is the general consequence of trusting friends with letters. By other letters I am acquainted with the promotion in our Regiment, by which I at length get a company. A good deal of rain in the night.

January 17th.—A windy, hazy morning. The *Savage,* a sloop of war from Antigua, anchored at the mouth of the Careenage ; she is looking for Admiral Parker to acquaint him that the French Admiral de la Motte Piquet with five or six sail of the line and some frigates is off St. Kitts. We are told he is going to St. Eustatius for a convoy of provisions for Martinique. The *Savage* sailed again. Some rain fell this evening and in the night.

January 18th.—A hazy but pleasant morning. Two ships are to leeward, supposed to be the *Savage* and a ship which sailed with her driven down by the current. This being the birthday of our English Queen, 21 cannon were fired. Gentle showers through the day and night.

A week of very unsettled weather. About noon on the 27th, Commodore Collingwood and his fleet got under way from the Gros Ilot, and stood to windward.

January 28th.—A fine morning. Commodore Collingwood and his ships are off Fort Royal harbour. The afternoon turned out very rainy and windy. A great quantity of rain fell during the night.

January 30th.—A windy morning, but without rain. We discover our fleet under Commodore Collingwood lying off Fort Royal harbour. Admiral Parker with his division is supposed to be looking for the enemy about St. Eustatius. A quantity of rain fell in the afternoon. A brig and a sloop taken by the Commodore came into the Careenage to-day.

February 3rd.—Received a letter from Captain Williamson. He informs me of the death of Captains Carter[1] and John Scott.[2] I am appointed captain of a company in England[3] and to be relieved by Captain Wright.[4] Our fleet is not in sight. A fine day.

February 10th.—A fine morning without rain. Small showers through the day and night. This evening a man-of-war of Admiral Parker's division came to anchor off the Careenage, having in company a store-ship which had parted from Admiral Rodney's fleet on January 28th. She did not call at Barbadoes, but fell in with Admiral Parker's fleet to windward of that island.

February 11th.—A fine morning. Two large ships are seen to leeward. They came off the Careenage in the afternoon, and prove to be the *Venus* frigate and a line of battle-ship of Collingwood's division. Before dark we saw the remainder of his fleet off Martinique. A "Snow," thirty days from Boston, intended for Martinique, came from the windward, and ran down amongst our ships off the harbour's mouth. She considered this to be the island she was bound to, and the ships of course French. She was brought into port directly. Rain in the night.

---

[1] Captain John Carter (Kane's List, No. 180), one of General Burgoyne's army died during its detention in America on May 17th, 1779.

[2] Captain Alexander John Scott (Kane's List, No. 274), died in Newfoundland, September 24th, 1779.

[3] Captain Downman's promotion dated November 11th, 1779.

[4] Captain Jesse Wright (Kane's List, No. 335).

February 13th.—A rainy bad morning. Collingwood's fleet are off the Gros Ilot. We are told he has driven M. Piquet a great way to leeward, and that the *Venus* silenced a battery on Martinique, landed some men, spiked the guns, and destroyed two French ships that were at anchor.

February 14th.—A very fine day. Two ships of the Commodore's division are at anchor at the mouth of the Careenage. The remainder are blocking up M. Piquet, who is in Guadeloupe with five sail of the line and three frigates. I am told by a navy officer that one of the ships destroyed by the *Venus* was from Glasgow with a rich cargo on board, absolutely bound to Martinique. The papers which were found on board shewed that she was cleared from Glasgow and intended for the island where she was destroyed, which I hope will be the fate of every traitor to his country.

February 16th.—A remarkably fine morning. We can distinguish the houses in Martinique with the assistance of a glass. A great deal of rain fell in the night. Cannon firing was seen in the night on the coast of Martinique, and our fleet was seen close to Fort Royal harbour this morning. A vessel arrived yesterday from Barbadoes, which informs us of General Vaughan, with troops and a large convoy of merchantmen, being arrived at that island from England.

February 20th.—Very fine through day and night. This afternoon a frigate with six victuallers arrived from Barbadoes. General Vaughan brought with him two regiments from England; one is to remain at Barbadoes, the other is gone to Jamaica. He is gone to Antigua to look into the state of the island, from thence he will visit St. Kitts, then Tobago, and lastly this island. Admiral Parker with his division attended the General from Barbadoes, Commodore Collingwood is still guarding the entrance of Fort Royal.

February 24th.—A cold day with intervals of rain and sunshine. Rain fell in the night. M. de la Motte Piquet with his fleet has got into Fort Royal and is joined by four sail of the line in spite of the vigilance of our Commodore, who has been four or five times in chase, but could never catch him. Wonderful! A few nights ago one of their ships in pushing in got a peppering by some of our fleet.

February 26th.—Admiral Parker with his division of ships arrived and anchored in the Gros Ilot. The whole fleet are now very busy in wooding and watering, and two frigates are cruising near Fort Royal. M. de la Motte Piquet has now 9 or 10 ships of the line in harbour.

Sent to England by the packet which sailed on February 25th:—

To Messrs Cox and Mair, pay-lists and abstracts for January and February, 1780.

Pay list for *Delaware* prize money and bill on Cox for the amount.

Muster rolls for January and February, 1780, to the board.

A letter to Cox and Mair on bill enclosed on Board for £120/17/-

Letters to Mrs. Grosvenor, Mrs. Hunter, Mrs. D. and Uncle D.

February 29th.—The fleet as before, and fine weather. We are told that a French army of 10,000 men, convoyed by 15 sail of the line, are on their passage from Europe to the West Indies. Admiral Parker is preparing to intercept them.

March 8th, 1780.—A sailor was hanged this day on board the fleet in the Gros Ilot, for desertion. The whole fleet is still there.

March 21st.—Admiral Rodney has arrived at Barbadoes with three sail of the line. A fine day.

March 22nd.—A frigate arrived from Barbadoes informing us of four regiments being arrived from England. I went to the Choc this morning on board Captain Williamson's ship. He commands the Artillery on the present expedition, which we are now told is against the Grenadines. In the afternoon, a fleet of 30 or 40 sail were seen to leeward, not far distant from Martinique, supposed to be the French fleet that has been expected some time. They have managed well, for Admiral Rodney's ships are cruising between this island and Martinique to windward, and Commodore Collingwood with four or five ships between Martinique and Guadeloupe to leeward. A very windy day.

March 23rd.—Admiral Parker and his fleet got under way this morning from the Choc. He is too late. The French fleet are certainly got into port, for we cannot see anything of them from the hill. Our whole fleet anchored in the Gros Ilot, and all the transports, bombs, &c., came into the Careenage. A hazy, windy day.

March 24th.—This morning a fleet of men-of-war and frigates, 28 or 30 sail were seen standing from Fort Royal harbour towards St. Lucia. We soon found them to be French. Two of their ships went very near the Gros Ilot and made signals. Our fleet kept snug. In the afternoon, Captain Williamson and his men landed at the battery at the entrance of the Careenage, and all the transports warped up into the bay. In the evening the *Cyclops* and consort sailed with a detachment of troops to strengthen St Kitts and Antigua. A great many guns were fired in the night from the French fleet.

March 25th.—A fine morning. The French fleet are a few miles to leeward, except two ships which are very near the Gros Ilot. Mortifying enough no doubt to Admiral Parker and his officers. The whole fleet have their topsails loosed. Admiral Rodney we are told is expected this very day from Barbadoes. About 8 o'clock a number of ships were seen to windward coming down; Admiral Parker and his whole fleet got under way and stood to windward. The French fleet was to leeward of him on the same tack. About 12, the French fleet tacked and stood to the southward; about one o'clock the English did the same, at this very time near 30 sail of shipping appeared in sight round the Gros Ilot, the whole of which soon came to anchor at the Careenage. They are last from Barbadoes, and have on board four new regiments from England. As soon as the admiral saw the transports out of danger, he returned to the Gros Ilot, and came to anchor in exceedingly regular and good order. Admiral Parker has much merit on this occasion, his determination being to fight the French fleet, though so very much superior, rather than lose a single transport. But the French fleet did not seem inclined to come to action, notwithstanding their advantage in number, that is, they did not crowd sail as ships would do that had that intention. During the remainder of the day the French fleet kept beating to windward. We imagine they have heard of Admiral Rodney's five ships and are striving to get to windward of the island to cut him off from Admiral Parker, but the plan is better laid, for on the first appearance of Rodney, Parker's whole fleet will be under way and out to join him. An action seems inevitable as soon as this juncture is made. A number of guns were fired during the night at sea.

March 26th.—A fine morning. The French fleet are beating between the Gros Ilot and Martinique, and some of their frigates are considerably to windward.

March 27th.—A rainy, hazy morning. Many guns were fired this morning early from the French ships. They are more to windward than yesterday. Admiral Parker remains as before. About 10 or 11 o'clock we observed the French windwardmost ships bearing down and making signals to the rest of the fleet. In a little time after, the whole of the fleet bore away and went into Fort Royal harbour. About this time we saw signals made from the hill at Gros Ilot, and between two and three we saw five large ships from the windward coming round the Gros Ilot. We soon discovered them to be Admiral Rodney in the *Sandwich,* a 90 gun ship, and four 74 gun ships; they anchored in the bay and were saluted by Admiral Parker.

April 1st, 1780.—Fine morning. Gentle showers during the day. About 10 o'clock the fleet got under way from the Gros Ilot and stood over to Martinique shore.

April 2nd.—Rainy, cold disagreeable morning. The fleet not in sight. Several reports of cannon at a distance. In the afternoon we saw our fleet under Martinique.

April 3rd.—Fine day. The fleet is off Fort Royal harbour. Strange doings! Yesterday the British fleet was braved in this harbour, to-day the British fleet block up the French.

April 4th.—A fine clear day. Our fleet are standing over towards St. Lucia; about noon they returned to the Gros Ilot and came to anchor. Admiral Rodney is very ill.

April 5th.—Rain early this morning, the other part of the day clear and agreeable. Three French ships got into Fort Royal this afternoon. The signal was made from our hill to inform the Admiral of their being seen, but no notice was taken of it for an hour and a half, and then it was too late. Thus the great advantage of the Morne is lost by the inattention of the navy.

April. 6th—A fine morning. Several transports left the Careenage and went to the Gros Ilot. A movement of some kind or other seems to be on foot, for small vessels and men were collected at the Careenage yesterday and to-day.

April 7th.—A fine and cool morning. Our fleet remains as usual at the Gros Ilot. The bombs and tenders, with Captain Williamson, left the Careenage and joined the fleet. We are now pretty strong on the hill, (if sickness does not get amongst us) by being joined by part of the 89th, 90th and 91st regiments.

April 11th—Showery and cloudy day. Eight of our fleet are cruising off and on the shore of Martinique.

April 15th.—A fine day. The cruising ships are driven by the current a great way to leeward. About 8 o'clock this morning the whole fleet from the Gros Ilot got under way, and after a little time bore away to leeward and joined the cruisers. We are just informed that the French fleet with all their transports have got out of Martinique and gone. We do not know whither. Antigua and St. Kitts, I quake for you! We are now left again, except the *Fame* (which is condemned) and the bombs which are now in the Gros Ilot. It is not unlikely that we have a visit from the French soon. We are told they are determined to have this island, and the other day when their fleet came over they intended attacking, if Admiral Parker's whole fleet had not been here. They lost no time, for the day after the reinforcements arrived at Fort Royal, they came over to St. Lucia, and had not less than 12,000 men on board their ships.

April 18th.—A close cloudy morning and a shower early. We learn that the French fleet were seen north of St. Eustatius, and that our fleet are between the Diamond rock and Fort Royal harbour, but as the day is thick and hazy, we cannot discover anything of them.

April 21st.—A fine morning with gentle showers of rain. We are informed that Admiral Rodney fell in with the French fleet on the 17th, a few leagues to windward of Martinique; that an action ensued, but nothing decisive on either side. We are told that several of the British captains did not behave on that day with their usual fire and spirit, otherwise the day would have been glorious to Britain. Admiral Rodney we are informed acted most gallantly; he almost destroyed two of the enemy's ships before he was attacked by the French Admiral, who was obliged to sheer off, being so roughly handled and thrice on fire, and many of his people threw themselves overboard in despair. It is allowed the fleet was admirably brought into action, only from 15 to 20 minutes elapsing between the headmost and the sternmost ships being engaged. Admiral Rodney's ship was on fire during the engagement. The British ships that are found fault with are the *Ajax*, *Montagne* and *Medway*. It is positively asserted that had the above captains acted with the spirit of their chief, half of the French must have been destroyed or taken, notwithstanding their superiority in number of ships

April 22nd.—A fine day, but very hot with gentle rains. This morning, early, five ships appeared to windward of Martinique, bearing this way.

April 23rd.—Early in the morning the above ships came to at the Gros Ilot, they prove to be the *Actæon* and four frigates from a cruise. Rain in the night.

April 24th.—A warm close morning, the other part of the day clear and windy. A frigate appeared to windward. Four frigates from the

Gros Ilot weighed and went down and spoke her, and then bore away towards the lee end of Martinique, the other, the *Pegasus,* came to anchor in the Gros Ilot. General Vaughan came in her from the fleet. In the night the *Actæon* and all the frigates sailed from the Gros Ilot. The *Pegasus* is ordered to England immediately. Colonel Musgrave went in her.

April 26th.—An agreeable day with pleasant gentle showers. This morning early, saw a fleet of ships off Fort Royal harbour.

April 27th.—Rainy morning. The fleet seen yesterday is English and is now about four miles off the Gros Ilot. I went thither about noon, at which time Admiral Rodney and most of the ships came to anchor; a good many appear to have had a number of shots through them. The report respecting the Captains of some of the ships not doing well is confirmed. One of them is under an arrest.

April 29th.—A clear day. A French fleet is seen to leeward this evening not far from Fort Royal.

April 30th.—Our fleet got under way and stood over to Martinique on a fine day.

May 1st, 1780.—Our fleet is a little way to leeward of this island, standing towards it; in the afternoon about four o'clock, the whole came to anchor, some in Choc Bay, and others opposite the Vigie and Careenage. We saluted the Admiral with 19 guns, he returned 17.

May 6th.—A fine clear morning. The fleet got under way and stood towards Martinique. The *Cyclops* frigate brought in a rich French ship, which informs us of the French fleet being to windward of Martinique.

May 7th.—Hazy weather. We can just discover the English fleet under Martinique shore.

May 11th.—A rainy cool morning. Our fleet is not far distant from the Gros Ilot. A fleet of 10 or 12 sail of large ships are seen to windward, which we suppose to be part of the French, waiting there to intercept Commodore Walshingham. A ship came from Barbadoes yesterday, which left Cork on April 1st in company of a number of others, conveyed by the *Triumph* man-of-war; they are safely arrived at Barbadoes, and have 1,300 men on board, the remainder of the new regiments that arrived some time ago, and a few recruits. In the afternoon we discovered upwards of 20 sail of large ships to windward of Martinique. Our fleet is striving all they . . .

The diary ends abruptly, carried on apparently into another book which is not forthcoming. We know however that Captain Downman remained in St. Lucia until it was restored to France at the treaty of Versailles in 1783, and that he sailed from Grenada for England at the end of the following year. He retired upon full pay in May 1790, until appointed in December 1792, captain of an invalid company. In March 1796, he was promoted a Lieut.-Colonel, and finally retired on full pay in March 1819. The latter days of his life were passed at West Malling, Kent, where he died, aged 85 years, August 16th, 1825.

RECONNAISSANCE BY ARTILLERY.

BY

BRIGADIER-GENERAL C. H. SPRAGGE, C.B.

EVERY inspecting officer of Artillery must have found himself at times in difficulty as to how to answer in a satisfactory manner the question re "Reconnaissance" that meets him in the inspection Report, viz :—

"(*i*) INSTRUCTIONS IN RECONNAISSANCE."

Battery Commanders have an immense deal to do, and the artillery training of their batteries especially at home, where they have constantly to work with a never ending round of recruits, makes them grudge any time spent on training, which does not evidently lead directly to one end—the perfecting of their batteries in the great aim and object of artillery, viz :—good shooting.

Now, though "Reconnaissance" does not directly bear on the shooting of a battery, it does so indirectly, in that, it is a potent factor in the military life of every officer, or man, who takes an intelligent view of his profession; teaching him to observe places and country, to look at hills, roads and defiles from a military point of view, and further, teaching him to impart to others, details of information which it is impossible to gather from maps, or from individuals who have not been properly instructed in the art of communicating to others, information which they themselves have acquired.

To an army, none too well supplied with cavalry, batteries which can carry out a good reconnaissance, on which a General Officer can depend, might be of immense use. No great distances need be covered, but the near reconnaissance might often be carried out by the artillery whilst the army was at rest, previous to an advance, the cavalry being left free to cover the longer distances. No exercise could be better adapted for the improvement of the battery scouts, and scouting is a matter in which many batteries are still very weak.

It must be clearly understood that in no way is it intended to suggest the artillery could take the place of the cavalry, or carry out long reconnaissance. It is only that they might thoroughly work over the nearer ground, and by mastering its details give to the General (and their own artillery commander) that immense advantage which he, who has a thorough knowledge of the ground, must possess over one who only knows it by means of maps, or a hasty glance, from perhaps a distant elevation.

In India we have older soldiers, and lots of country for such work, and therefore we have some advantage, but I feel certain, that in England, as well as in India, the interesting work of reconnaissance, carried out in peace time, would do much to open men's minds to what will be required of them in times of war. I am sure, the more you can get men to work at interesting topics, the better for them—at something that exercises eyes and brain—something that imbues young officers, and N.C.O.'s with habits of observation, and self reliance, and no subject does this better than Reconnaissance.

I put the difficulty before the late General Duncan, then commanding the Forces in the Bombay Presidency, and with his sanction and approval drew out a few remarks for the guidance of Artillery officers. I think that these notes may be of use to other officers, as giving some indication as to the lines on which such work could be usefully carried out by Artillery.

From reports already to hand it is evident that, some batteries at any rate, have entered into the work with spirit and when all are in, I feel confident that an excellent and instructive exercise will have been carried out.

A specimen of the class of Reconnaissance which appears to me to be needed follows, together with an explanatory map of the country worked over.

Example of a Battery Reconnaissance Scheme (With Map).

The C.R.A. in accordance with "Divisional Orders" details a Field Battery to carry out a Reconnaissance of the country between the MOSHI-BHOSRI-DARPURI road, and, a line due north from WARGAON Ford to CHAROLI Ford.

(*Note* :—The cavalry have been pushed forward to obtain touch with an enemy advancing upon POONA from the north.)

The battery is to report upon—

(i.) Any suitable positions the Division might occupy, in event of the enemy attempting to cross the INDRAYANI river.
(ii.) All artillery positions.
(iii.) Lines of advance suitable for—
  (*a.*) The infantry of the division.
  (*b.*) Guns.
  (*c.*) Wheeled transport.
  (*d.*) Pack transport.
(iv.) Lateral communications.
(v.) Positions covering the fords over the INDRAYANI river.
(vi.) The INDRAYANI river from MOSHI to CHAROLI.
(vii.) The supplies.
(viii.) Transport available { pack animals. / country carts.
(ix.) Camping grounds (briefly).

The O.C. of the battery having received the above orders—studies his map.

The only two officers available are Lieut. A. and Lieut. B.

The Major issues orders as follows:—

" Lieut A. (with a party of N.C.O.'s and men drawn from your section), march at . . . a.m. *viâ* DARPURI Bridge and BHOSRI on MOSHI. Report on the country, &c., one mile east and half a mile west of your line of march.

Maintain communications with the centre section patrol on your right. Give me a full report, as indicated, accompanied by a sketch, to illustrate your report.

I march with the centre section patrol. At MOSHI, halt and send me your report and sketch."

Lieut. A. accordingly makes a tracing or enlargement, from a map of the country, of his line of advance. Not having a N.C.O. who can sketch neatly he fills in the details himself (as reports come in from his flankers and scouts) as he moves along.

He details a N.C.O. to write a report as he dictates information.

His party consist of—

One Sergeant, two Corporals, three Bombardiers, two Signallers, and five or six Gunners (or Drivers).

The Sergeant and four men are detached to report on the country to the east of his line of march, and establish communication with the centre section patrol. The Sergeant is ordered to report specially on positions for guns, lateral communications, villages, supplies, and water.

A Corporal and two men are detached half a mile west, for a similar purpose.

Lieut. A., does not confine himself to the road, but is careful to examine all reported "positions" *personally*, leaving the reconnaissance of the road to Corporal X. and a couple of men, during his absence.

He is in communication with, and receives frequent messages from his C.O. as to the examination of particular localities.

On one occasion, concerning a report on a certain position, the C.O. joins him and reconnoitres the ground personally.

At MOSHI, Lieut. A. completes his sketches and reports, and sends them to his C.O.

The centre section patrol.

This section having no subaltern, is put under the command of Sergt.-Major V. (or its senior sergeant).

A specially selected N.C.O. is sent with this patrol, to fill in the details of the sketch.

(The details of the order of march of this patrol are not given, but their line of advance is from KALAS *viâ* DIGHI on ALUNDI. The strength of the party is similar to that under command of Lieut. A., and communication is maintained with the patrols from the right and left sections, on either flank).

The C.O. marches with this patrol.

He is accompanied by—range-takers, a signaller, a trumpeter, and some orderlies.

The range-takers are detached as required to the flanks.

From the centre the C.O. should be able to get a good idea of the whole country, from reports received from time to time from the flank patrols, and his own observation.

The right section patrol under Lieut. B. (orders of march and details of strength of party omitted) works along the line from WARGAON, *viâ* LOHOGAON on CHARHOLI, maintaining communication with the centre section patrol.

Lieut. B. having a N.C.O. skilful with his pencil, permits him (under supervision) to amplify with details, the enlarged tracing of the map. Lieut. B. keeps his own report, and having no sketch to fill in, is able to examine the strip of country covered by his men, very thoroughly. He is a smart officer, with a quick eye for a country. His report is valuable, concise and clear.

The Battery Commander, on arrival at the river, has a very fair idea of the country covered by his men. He has examined several positions personally. He has ascended commanding features of the ground, village towers, &c. He has used his field glasses with good effect. He has caused certain ranges to be taken. He has kept an eye on the working of his flank patrols.

The whole reconnaissance has been rapidly executed (at a mean rate from five to six miles an hour. To do this, horses have had to be bustled. Country requiring few remarks has been crossed at a gallop. The flankers have covered much ground. Long signal messages have been avoided. All long messages have been sent by mounted orderlies.

At or near ALUNDI the C.O. halts. All patrols are on the river. They are examining and reporting on it.

The first sketch and reports come in from the right (Lieut. B.'s patrol). The C.O. notes time thereon, reads it and in his own report makes remarks on the information received.

The reports and sketches from the centre and left come in, in due time. In perusal of these reports, the C.O. perceives the ford at MOSHI has not been fully enough reported. The bed of the river, is not stated if practicable for guns or not. The depth is not noted.

The information is incomplete; mounting his horse, the C.O. proceeds to MOSHI. The delay causes the time of the whole report to be delayed. The smart work done by Lieut. B., is partially neutralised by the imperfect work of Lieut. A. The information is obtained.

The whole Reconnaissance is now complete. The information obtained is very complete. There are several "elevations" of Bridges, and free-hand sketches of ground viewed from certain positions.

The ranges appear accurate. The information relative to transport and supplies seems ample.

The C.O. finishes his own remarks noting the time thereon, and despatches the whole of the sketches and reports to the Adjutant, R.A. The C.R.A. is able to hand to the G.O.C. of the division, full information of 50 square miles of country, which has been collected in a few hours.

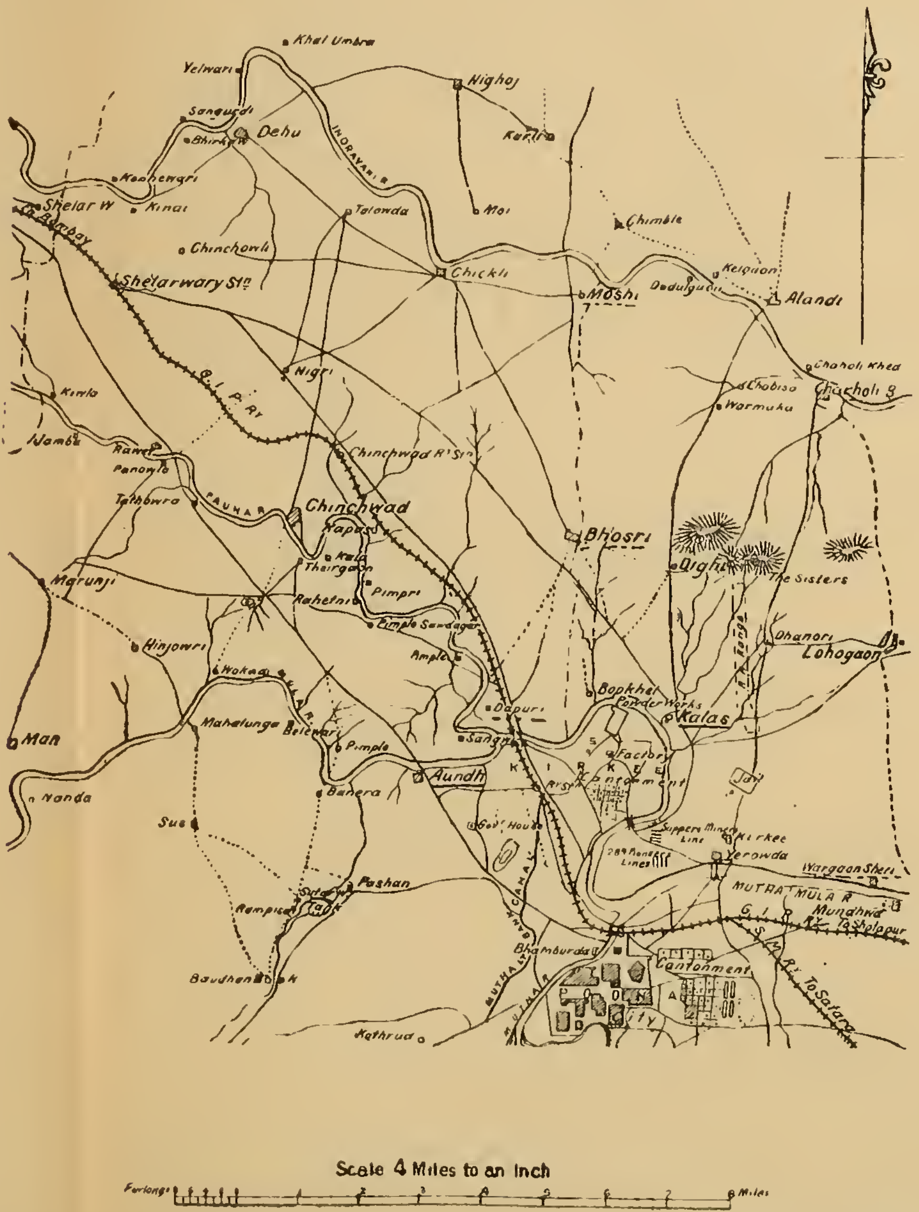
A circular memorandum on the subject was issued with the following instructions:—

(*a.*) The reconnaissance and sketching of batteries to be carried out on the lines indicated in "Cavalry Drill," Section 8, Part V., which with slight adaptations could easily be carried out by Artillery.

(*b.*) The Officers and Non-Commissioned Officers of each battery (under the Battery Commanding Officer) being required to execute a reconnaissance and sketches with some definite object—working on a front, say, 4 or 5 miles (each Section working parallel and in communication with each other).

The object should be primarily an Artillery one, *i.e.*, made with a view to the advance or retirement of Artillery—not less than a Brigade Division,—its positions, the places where likely to be attacked, &c., &c., in addition to the details, concerning the reconnaissance of a country, laid down in Section XI., Text-Book of Military Topography.

(*c.*) 50 square miles per day should be covered and reported upon by the Officers and Non-Commissioned Officers of each Battery, and the whole should be done in one day.



Map of country north of Poona illustrating the ground over which the Battery Reconnaissance was ordered to be carried out (Ground enclosed by lines thus - - - -

[*To face page* 582.

(*d.*) Officers Commanding Batteries will collect and collaborate *all* the reports and sketches received from the Section Commanders in the field, and these, together with their own remarks, will represent the work of the *Battery* for the day.

(*e.*) Where two or more Batteries are stationed together, the scheme will be carried out by the Brigade Division, under its Commanding Officer, who will collect and collaborate the sketches and reports of the Batteries under their command, and forward the whole, with their own remarks, to the General Officer Commanding the District.

Each Battery should be required to report upon an area not less than 50 square miles.

(*f.*) All sketches should be executed on the same scale—say, 2″ to 1 mile, which is a convenient scale for a Cavalry sketching case.

(*g.*) The use of small scale maps of the country, or handkerchief manœuvre maps, is permitted, whenever these are available.

(*h.*) The "General" and "Special" ideas for these reconnaissances should be drawn up under the orders of the General Officer Commanding the District, and only issued the night before.

(*i.*) All work should be done in the field, and the time carefully noted and certified to by the Battery Commander.

(*k.*) Battery signallers and range-takers may, of course, be utilized.

2. The attention of Royal Artillery Officers is invited to Cavalry Drill, 1898, Part IV., Section 3, Section 4, Section 5, Section 6, and Section 7—also Part V., Section 8.

3. The sketches, reports, &c., together with the remarks by General Officers Commanding on the work done, should be furnished to Command Head-Quarters, where the relative merits of the work done by the Batteries in the Command will be compared.

THE DEVELOPMENT OF ARMOUR DURING THE YEARS 1893-98.

BY

CAPTAIN C. ORDE BROWNE, *late* R.A.

Continued from No. 11, page 557.

PROGRESS OF MANUFACTURE FROM 1893 TO 1898.

Krupp's process.

The chief new feature in armour is the Krupp process, the results of which have appeared in the trials above noticed. The process is sufficiently peculiar and the details still treated so far as manufacturing secrets that little can be written with advantage. The effect is to impart extraordinary toughness to armour in conjunction with a very hard face, and as above noticed this tells chiefly in thick plates because when severely attacked they are subject to a rending strain which seldom falls on a thin plate. This often arises from the fact that the width of a thick plate is not very much greater than of a thin one, so that shot whose powers of perforation may be fairly matched against thick and thin plates will impose a much greater shock and rending strain on the former. For example in the attack of 6-in. and 11$\frac{1}{16}$-in. Vickers' plates (see pages 510 to 512) the 6-in. plate was attacked by 6-in. shot whose perforation was equal to 13·45 of iron, or 2·24 times the thickness of the plate. The 11$\frac{1}{16}$-in. plate was attacked by 12-in. shot with 23·5-in. perforation through iron, or 2·05 times the thickness of the plate; that is slightly less proportionately than the 6-in. plate, but on the other hand, the area of the thick plate not increasing at all in proportion to its thickness, the striking energy per ton of the 6-in. plate is only 505 ft.-tons, while that of the thicker one is 1,146 ft.-tons; and the 6-in. shot in the 6-in. plate, which is only 6 feet wide, constitutes a wedge of $\frac{1}{12}$ of its width, while the 12-in. shot in the 11$\frac{1}{16}$-in. plate 7 feet wide is a wedge of $\frac{1}{7}$ of its width. It is easy to see then that toughness is specially called for in thick armour. The succession of manufacturing processes by which this toughness is imparted is very curious. Steel which would be thought brittle and very unsuitable for the purpose, is subjected to processes which would in past days have been thought likely to make matters worse, great toughness being the result. The hard face is sometimes, but not always, obtained by the action of gas instead of solid carbon. Undoubtedly in each factory modifications may be introduced and each has its own method of treatment based on experience. The Krupp process is one calling for special skill and perseverance and could not fail to present difficulties at first which might be overcome by each establishment in its own way.

On July 21st, 1898, Brown's and on Sept. 29th, 1898, Cammell's $11\frac{1}{16}$ Krupp plates gave excellent results[1] and it may now be hoped that the Sheffield firms have overcome most of their difficulties.

Nickel. As said already, Nickel had come into use in Sheffield before the adoption of the Krupp process, any difficulties attendant on its use being more than compensated by the toughness it imparts when used skilfully. In the United States a 12-in. Krupp plate made by Carnegie was tested on Sept. 22nd, 1898, at Indianhead. It defeated an attack nearly agreeing with that applied to our Sheffield plates, but was perforated by a 12-in. 850 lb. shot with 2,022 f.s. velocity. One objection to the use of Nickel was the difficulty of making holes in the hardened face of a Nickel steel plate, even with the application of the electric arc drill. In Sheffield, even before Nickel was adopted, holes were generally drilled before the final hardening of the face, such holes being filled with plugs during the last process. It is, however, desirable to secure the power of drilling and tapping holes in the face of an armour plate, even after it is fixed on a ships side for the attachment of swivels, ladders, etc. In the United States the difficulty of drilling holes in a hardened Nickel steel face has been overcome by a process projected by the Thomson Electric Welding Company. In this two copper contacts are applied at the spot required to be softened, and an electric current of large volume is sent through the portion of plate lying between them which is brought to a dull red heat. Without describing here the special apparatus employed, it may be said that it is such as can be applied out of doors to the vertical armour of a ship and safely handled. If, however, the current ceases abruptly, the mass of metal surrounding the heated spot at once chills it hard, consequently in the case of an isolated spot for a single hole, the current must be gradually decreased. The neatest application of the process is to the case of cutting a gun port in a shield. It may happen that the form and mass of the plate in which the port is required is such that if the port is made before hardening, the shield during that process cracks in two, consequently it has been found best to cut the port after hardening. The outline of the port to be cut is annealed bv causing the copper contacts to travel slowly along it, annealing it by the current as they go. By this means, a strip about $2\frac{1}{4}$ inches wide is softened, which can be operated on as easily as before the hardening process. Fig. 29 shows Brown's forging press.

The following is a brief description of the hardening of a 9-in. Harveyed plate for H.M.S. "Majestic," as witnessed by the writer in 1894 at Brown's Atlas Works, Sheffield.

The chilling is practically the final stage in the manufacture of Harveyed plates. The plate is heated in a special regenerative gas furnace, by which a very easily regulated and uniform heat is obtained. The roof of this furnace, weighing twenty tons, is lifted in one piece by a crane, and travelled to one side, while a second crane comes over the furnace, picks out the plate with four dogs, and places it over the

---

[1] These results more or less resemble those obtained by Vickers. The most severe blow defeated by a thick plate yet recorded, is that delivered on a Krupp 11·8-in. plate on June 5th, 1896, by a 12-in. 715 lb shot with a velocity of 2036 f.s., involving a calculated perforation of 27·5 in. iron or 2·33 times the thickness of the plate.

Face hardening at Sheffield.

lower douche of the Tresidder chilling apparatus. The upper douche, suspended from a carriage running on overhead rails, is then immediately advanced, and makes an automatic water-tight connection with the pump delivery. A patent indicating apparatus is then adjusted on

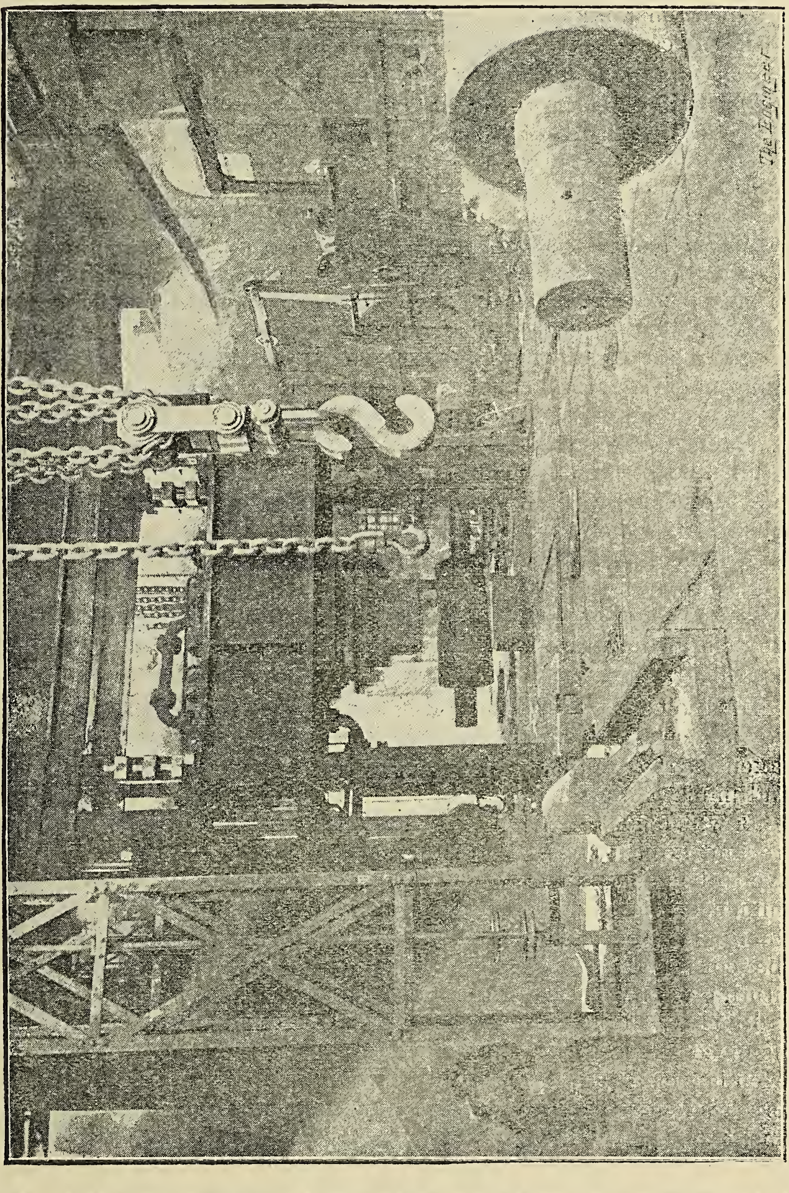


Fig. 29.

each of the long edges of the plate, by which the change of form during the whole chilling operation is automatically and instantaneously recorded. This does not take many seconds, and immediately it is completed the then shape of the plate, which may have slightly changed during heating and handling, is known, and the best method of applying the water decided upon. The water is then immediately turned on, and issues from thousands of small orifices with great pressure upon both the upper and lower surfaces of the plate, cooling them almost instantaneously. The application of the water is continued in the case of 9-in. plates for from thirty-five to forty minutes, and the plate is then usually from $\frac{1}{8}$ in. to $\frac{1}{4}$ in. more convex on the face than required by the finished moulds. This convexity is purposely aimed at, because it can easily be remedied by pressure while the plate is cold, whereas an error in the concave direction could not be rectified without going through the whole chilling process again. Absolute accuracy of form from the chilling operation it is practically impossible to secure. After the chilling is finished, the plate is tested with large hardened cast steel punches, struck with a sledge hammer, which must be fractured against the hard surface without making an appreciable indent. All holes in the hard surface required for attachments will have been made previous to the chilling, but the final trimming of the edges to exact shape has to be carried out subsequently. This is accomplished on a planing machine as far as regards the soft portions of the edges, but as the planing tool comes up the edge to within about three-quarters of an inch of the hard surface, the material becomes too hard to be cut with a steel tool. The projecting rib thus left is removed by grinding, either on a large grindstone, or an emery wheel used as a planing tool. Finally, the bolt holes in the back of the plate by which it is attached to the ship are drilled and tapped, and the plates are erected in their proper relative position, and any slight deviation from exactness of fit is further corrected by subsequent grinding.

Development of Armour on Ships from 1893 to 1898.

Q.F. and hard faced armour.

Two things have specially influenced the shape that ship's armour has taken during the last few years, namely the development of quick-fire and improvement in the quality of the armour itself. Some of the elements which constitute quick-fire are now applied to guns of large calibre and it is difficult to draw the line where a piece ceases to deserve to be called a Q.F. gun; the class of ordnance, however, that has influenced the distribution of armour on ships, and indeed affected the whole plan and structure of the vessel is the class of gun which can be conveniently mounted and worked behind medium armour constituting what is termed the ships secondary armament. In British ships 6-inch Q.F. guns generally fulfil this function and in foreign vessels pieces of 15 or 16 c.m. are often employed, occasionally 8-in. and even larger pieces, though the 4·7-in. gun is much used in British cruisers and still lighter pieces in many foreign ships.[1] This armament is generally protected by from three to six inches of steel armour and it constitutes a means of attack on which probably naval officers would principally depend. A projectile, weighing 100 lbs., striking with a velocity of, perhaps, 2,000 f.s., delivers a severe blow, though not sufficient for belt attack, it is the speed of this fire, however, that gives it its specially formidable character. To give quick-fire its due weight it is necessary to take into account both the energy and the speed of delivery of both quick and slow fire. The simplest way to do this is to multiply the energy of a single round by the number of rounds fired per minute, which gives the energy of each piece per minute and by further multiplication and addition the ships energy of fire per minute. The following table shows the working of the energy of fire of a ship of the *Majestic* class, the rates employed being obtained from the *Excellent.*

---

[1] The writer has repeatedly dwelt on the insignificant power of the 4-in. Q.F. gun armament of the U.S. armoured cruiser *New York*.

Ships energy of fire per minute.

Name of vessel.	Armament.	Muzzle energy per gun foot - tons.	Rate of fire per gun.	Total energy of fire per minute, foot-tons.
Majestic	4-12-in. 46 ton wire	33·940	3 rounds in 4 mins.	101·820
	12 - 6-in. Q.F.	3·356	16 „ in 3 „	214·784
	16-12.pr. Q.F.	425	10 „ per min.	67·680
	12 - 3-pr. Q.F.	80·3		9·636
				393·920

It will be observed that the total energy of fire per minute of the Q.F. 6-inch guns is more than double that of the primary guns. As, however, a ship could generally engage with all her primary guns and only half of her Q.F. pieces, the energy of the fire of the 12-inch and 6-inch guns may be considered to be nearly equal. It is delivered in the form of three blows by the 12-in. and 32 by the 6-in. guns. The former may undoubtedly produce a more decisive effect by a happy hit, in fact, "belt attack" with the possibility of reaching the so-called vital parts of the ship is open to the 12-in. gun and not to the 6-in. Nevertheless, in most naval engagements the chances are against such decisive success, owing to the few rounds fired and the movement of the enemy, whose armour will usually be obliquely struck. Consequently, more dependence can be placed on the effect of the 32 rounds of the 6-in. guns, which can hardly fail to work great mischief in the secondary or non-vital parts of the enemy including her Q.F. gun positions and conning tower. The 12 and 3-pr. Q.F. guns may do something so far as they have opportunity, but in close action it is a question if many of them could be manned without their detachments being swept away immediately, seeing that they are in a great measure unprotected. The bearing of these considerations on the disposition of ship's armour is obvious. It is essential that the heavy Q.F. guns should be well protected and since both Harveyed and Krupp armour six inches thick, are able to defeat the attack of 6-inch guns, it follows that plate of this thickness or something approaching it should be if possible used to protect our secondary batteries and other important parts of the upper structure of our ships. Happily for us, foreign powers have hitherto generally employed three, four or five inch steel plates for these purposes and until quite recently ordinary steel only has been used, which would place them at a disadvantage so obvious that it doubtless will not long be allowed to continue. For if the above estimate as to the part borne by the Q.F. guns is correct and if two ships engage of which one's Q.F. guns can attack her enemy's corresponding armaments freely, not only with shot but also with A.P. and sometimes even common shells, while her enemy can reply only with projectiles which are powerless to get through her armour, only some very exceptional fortune can prevent the speedy defeat of the less protected ship.

The fight off Santiago de Cuba.

Since the above was written and submitted for printing, the fight outside the harbour of Santiago de Cuba took place, giving lessons which are of the first importance, which will be dealt with as briefly as possible. The conditions were as follows:—Four Spanish cruisers, the *Infanta Maria Teresa, Vizcaya, Cristobal Colon* and *Oquendo* suddenly left the harbour and attempted to run the gauntlet of the blockading United States war-ships. These were the battle-ships, *Iowa, Texas, Oregon, Indiana, Massachusetts,* and cruisers *Brooklyn* and *New York.*

The *New York* happened to have left the station just before the attempt was made. Of the rest, the *Brooklyn* had 21·9 knots and the *Oregon* might make nearly 17, but the other battle-ships were not in a condition to go nearly so fast. The Spanish cruisers nominally had about 20 knots speed, consequently taking the American fleet by surprise there was room to hope for their escape. They steamed out in the above order and then turned west covering two torpedo catchers, who accompanied them, but who were immediately destroyed. The Spanish orders were to deliver all their fire on the *Brooklyn* which, besides being the ship of highest speed, happened to be at the west end of the American line. The U.S. vessels got under weigh and in action surprisingly quick, everything being in good order, while the very reverse was the case with the Spanish ships, whose armaments *were* in some cases *deficient of their principal heavy guns* and whose bottoms were so foul and coal supply so bad that they fell far short in speed. They suffered from a very heavy fire as they passed the American ships, and being pursued by the *Brooklyn* and *Oregon* the *Maria Teresa Oquendo* and *Vizcaya* were in succession set on fire and riddled in their upper structure and had to run into shore and surrender in succession. The *Colon,* which was built in Italy, and whose upper structure was protected in a great measure by 6-in. armour, suffered comparatively little, obtained about three miles start and ought to have escaped easily, but was overtaken and surrendered in about 3 hours after leaving the harbour.

The most obvious lesson as to structure is the need for medium armour on the upper structure and the necessity of getting rid of wood, this has in fact been done in Germany. As to artillery fire, the incendiary effect of the secondary gun fire of common shell is seen to be tremendous. It may be however that ships containing no wood and with medium armour extensively used might bear it, so that the attack of the primary parts can not be kept out of view. The incendiary action is probably due to lumps of explosive being driven into the wood work which would burn furiously, having their own oxygen in the composition and perhaps resisting the action of water to a great extent.

Progress in Ordnance between 1893 and 1898.

The progress made in ordnance consists almost entirely in the development and application of quick-fire. If our battles are likely to be fought mainly by our heavy Q.F. guns, it is not surprising that every effort should be made both to increase their power and also to find room for them in vessels which did not originally carry them. Thus in England the greatly increased muzzle-energy of 5373 ft.-tons[1] obtained by the new Vicker's 6-in. Q.F. gun at Portsmouth, possesses an importance which is, in a measure, appreciated by all, though perhaps fully appreciated by few. This, then, is an example of development of power. A new 12-in. Vickers gun and a 9·2 Gun Factory naval gun have been taken in hand as well as field Q.F. guns. Notable examples of the increased application of Q.F. guns in the armament of ships were already to be found in 1896 in the case of our *Argonaut* class of cruisers of 11,000 tons displacement, carrying sixteen 6-in. Q.F. guns as compared with the *Powerful* of 14,200 tons, carrying two 9·2-in. ordinary guns and twelve 6-in. Q.F. pieces. It will be found on working out that the new cruisers possess an increased energy of fire, compared with their predecessors, which may amount to 20 per cent., but which, on even a considerably lower estimate, means a great increase of power in comparison to the displacement of the vessel.

Changes in French ships.

The French have removed the central barbette heavy gun in the *Amiral Baudin* and other vessels, replacing it by a redoubt containing four Q.F. guns, which constitutes an approach to our British plans dating as far back as the Admiral class. Germany and the United States have brought in Q.F. guns of increased calibre and in increasing numbers. These are only illustrations of the general current of opinion.

Elswick designs.

Elswick has long advocated and supplied very powerful Q.F. guns. The *Esmeralda,* launched in 1896, carried two 8-in. Q.F. guns, besides her sixteen 6-in. Q.F. pieces. The introduction of the Vickers 6-in. gun is intended to give us a broadside piece of greatly increased energy, which would generally be capable of attacking an enemy's secondary batteries with armour-piercing if not with common shells, and, even in the case of most 6-in. shields, might easily get shot through. In short, the great point to secure is superiority in attack and defence for the Q.F. gun. Happily, this is possessed in a high degree in the designs of Sir William White, where each 6-in. gun is in many cases, both in first-class cruiser and battleship, mounted in a 6-in. casemate.

Vickers 6-in gun.

Sir W. White's casemates.

---

[1] The calculated perforation is 22·7 in. of iron and the muzzle velocity was 2784 f.s. There is a great tendency for this to fall rapidly with large cordite charges fired in quick succession. It is hoped that this may be prevented to a great extent by expanding gas rings, but it is well to make allowance for it in estimating results in action.

U.S. Q.F. guns.

In the United States, the manufacture of 6-in. Q.F. guns with the Fletcher breech mechanism progresses, and a system of conversion of existing 6-in. pieces into quick-firers was approved and applied, and all lighter guns carried on United States vessels are now to be quick-firers.

German Q.F. guns.

For the German navy it has long been decided that guns up to, and including 24 c.m. (9·45-in.) calibre shall be quick-fire pieces. The Krupp table of Q.F. guns in last year's *Annual*, indeed contained these pieces. The term quick-fire applies in a more limited sense as the calibre and weight of ammunition increases. In a certain measure, the British 12-in. gun has long been a quick-firer. The substantial fact is the recognition of the advantage of increased rate in discharge in greater or less degree, and the decision to make considerable sacrifice to obtain it.

British and foreign Q.F gun positions.

To pass from main features to details of construction; the Q.F. batteries having been spoken of may be dealt first. As already said the British secondary armaments are chiefly mounted in armoured casemates. The tendency of constructors of foreign ships is in the same direction. The more recent French, American and German vessels frequently have their Q.F. guns in separate protected position. In some cases the opening exists for shell attack beneath them where there is no armour. The British ships scarcely ever give such an opening and the Russian gun positions are also well protected beneath, but in some cases the Q.F. guns are all enclosed in the same wall so that a single shell which is powerful enough to enter might work wholesale destruction. In such vessels as the *Sissoi Veliky* and *Tria Sviatitelia* which have very thick steel belts from 16 to 18 inches thick, it might be well to divert the fire of primary guns from the belt to the Q.F. battery and attack with common shells which would easily get through the 5 inches of steel, and a single powerful shell thus fired might go far to silence the Q.F. armament. The United States constructors have made an interesting variation to the casemate by substituting a thin double wall inboard for the thick single one of the British ships. These double walls are connected with cross plates radiating from the centre of the casemate and both walls and cross plates are pierced with openings in no case opposite to one another but leaving zig zag paths open at all times from casemate to deck to any one by running through as it were in "knights moves." The advantages claimed are, equal immunity against fragments of shell flying straight, unbroken communication to all parts of the ship and better control of fire. The disadvantage is that products of explosion of shells which are specially destructive to life in the case of high explosives have much freer passage than in the British casemate.

An important change has been made in the British belt armour commencing with the *Majestic* class. For the 18-in. compound belt of the *Ramilles* class is substituted 9 inches of Harveyed armour, behind which a second protection is formed by curving down the deck armour to the lower edge of the belt instead of carrying horizontally to the upper edge. By this means, any protectile getting through the belt would still have between it and the vital parts of the ship a sloping 4-in. steel deck. The general arrangement of armour is shown in Fig. 30. Fig. 31 shows an application of corn pith cellulose which has been found very effectual in the United States the shot holes closing up remarkably well.

PLANS SHOWING DISPOSITION OF ARMOUR IN *MAGNIFICENT* AND *MAJESTIC*.

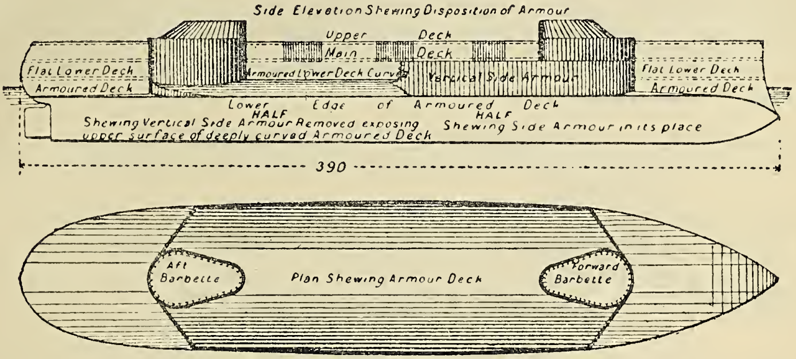
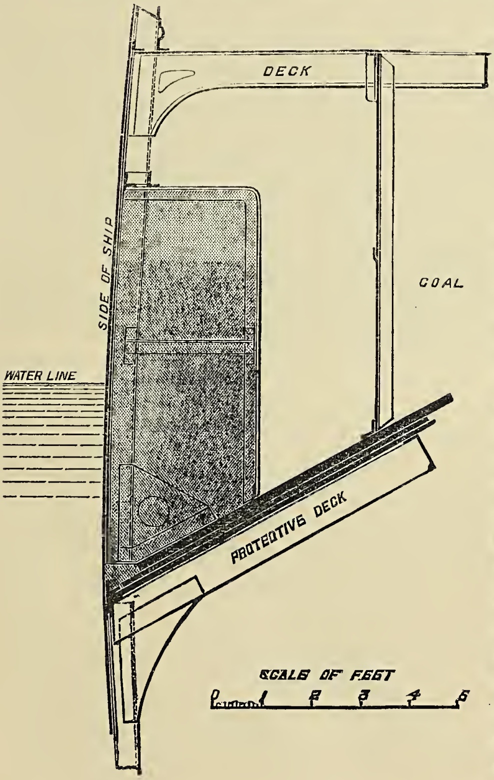

Side Elevation Shewing Disposition of Armour
Upper Deck
Main Deck
Flat Lower Deck
Armoured Deck
Armoured Lower Deck Curve
Vertical Side Armour
Flat Lower Deck
Armoured Deck
Lower Edge of Armoured Deck
HALF
Shewing Vertical Side Armour Removed exposing upper surface of deeply curved Armoured Deck
HALF
Shewing Side Armour in its place
390
Aft Barbette
Plan Shewing Armour Deck
Forward Barbette

Fig. 30.



ATTACK OF SHIPS ARMOUR.

In considering the question of the attack of ships armour, it must be remembered that a ships armour may be anything from wrought iron and the best hard faced steel, the newest ships having the best. For practical purposes if a table of perforations for the ships of any nation be required, it is best to base it on a table of wrought iron perforation and assign to each ship its equivalent in wrought iron. Obviously these equivalents will run from once to twice the thickness of the ship's plates, generally an extra inch added to the result will allow for backing and skin.

In estimating probable effect, not only the perforation due to the energy of the projectile must be considered, but also the structural strength of the projectile to stand up to its work. With shells this is principal consideration. It generally becomes a very simple matter, because if the energy is sufficient to break up the shell at all ranges the perforation becomes a constant, the shell's strength always being the limit of its power. The following may serve as a very rough guide to replace the rules given in 1893.

Rough rules for structural strength of projectiles.

Common cast iron shell may perforate ½ calibre of wrought iron.
Common steel shells with nose fuzes may perforate from ½ to ⅔ calibre of steel (unhardened).
Common steel shells pointed, may perforate slightly more than the above.
A.P. steel and Palliser shells may perforate over 1 calibre of ordinary steel.
Steel shot may perforate from 2 to 3 calibres of wrought iron,
Steel shot " " 1½ to 2 calibres of ordinary steel.
Steel shot " " 1 calibre of Krupp or Harveyed steel.

It is specially important for the attack of ship's Q.F. batteries to know that a 6-in. common shell will perforate 4 inches of ordinary steel up to the glancing angle, that is about 45°.

One point deserves special notice with regard to common shell attack, namely that a hard face which defeats the boring attack of sharp pointed armour piercers by fracturing the point is probably of little or of no use in resisting the punching attack of common shell which drive out a dise of metal. Consequently if thin hardened faced plates are substituted for thicker steel plates of an ordinary kind, it may follow that while resistance to armour piercing shot has been maintained or increased, the armour is less able to resist such guns as are sufficiently powerful to attack with common shell. This is important with regard to the lighter armour on the upper structure of ships. Consequently, the increased toughness of Krupp process armour has a special value. On this question, however, experiments are needed to enable any definite statement to be made.

WHO INVENTED THE LEATHER GUNS?

BY

LIEUT.-COLONEL H. W. L. HIME, *late* R.A.

FOUR claimants to the invention of the Leather Guns have been brought forward at one time or another :—Gustavus Adolphus, Colonel James Wemyss, Melchior Freiherr von Wurmbrandt, and Colonel Robert Scott.

The claim made on behalf of the King of Sweden, by the Rev. Dr. Walter Harte,[1] may be at once put aside as baseless. So busy a prince had no time for the construction of pieces of Artillery. Clear and convincing proofs would be necessary to establish such a claim, and Dr. Harte has given us no proofs whatever. Two writers whom he quotes give it no real support. Pomo merely speaks of the guns (at Leipsig) as a late invention,—"cannone d'invenzione nova &c."[2]; and Lotich confines himself to an ambiguous assertion,—"cujus (the king's) industriâ inventa tormenta bellica, minoris generis, et ferè portabilia &c."[3] No one will lay the slightest weight on these vague and dubious statements. The king adopted the guns, but he did not invent them.

Colonel Dodge, of the American army, tells us that the king "himself contrived" 3 and 4-pr. shortened guns in 1625[4]; but as he has cited no authorities (except generally, in his preface), it is impossible to discuss a statement which is apparently due to some oversight or misapprehension. Fryxell, it is true, speaks of these iron guns as "the King's second invention"[5]; but his meaning is sufficiently plain. He is speaking of the King's adoption of a second invention made about that time. It matters little, however, whether this explanation be correct or not. The highly improbable proposition that Gustavus invented *any* gun, is not, and cannot be established by the bare assertion of anybody. The invention in question was almost certainly due to Colonel Hans Henrik von Siegeroth, who discovered experimentally, in 1624, that the existing iron field guns could be considerably shortened without diminishing their shooting power.[6]

---

[1] *Hist. of Gust. Adolphus,* London, 1807; I, 156; II, 42, *n.*

[2] *De'Saggi d'Historia,* Venice, 1640; p. 33.

[3] *Lotichii Rerum German. &c.,*" Frankfurt, 1646: Part I, vol. 2, p. 782.

[4] *Gustavus Adolphus,* Boston, U.S., 1890; p. 43.

[5] *Gustaf Adolfs andra uppfinning;* "Gustaf II Adolf," Stockholm, 1894; p. 152.

[6] *Biog. Lexicon,* Örebro, 1855; art. 'Wurmbrandt'.

The evidence in favour of Colonel Wemyss, Master Gunner of England under Charles I, rests upon the authority of a few writers who took part in the Great Rebellion, and who had no opportunity of verifying their statements. Sir Richard Bulstrode, for example, in speaking of the action at Copredy Bridge in 1644, says that Wemyss was taken prisoner by the Royalists, and with him some guns of his invention. He had had "a good sum of money given him for the Invention of making those Leather Cannon".[1] That Wemyss, owing to the office he held, had superintended the manufacture of these guns, is beyond a doubt; but there is no tittle of proof that he had invented them. In fact, as will be seen when we come to speak of Scott, the evidence we possess makes it quite certain that he did not invent them.

We learn from the Swedish Biographical Lexicon already quoted that, after the outbreak of the Thirty Year's War, Freiherr M. von Wurmbrandt resigned his post at the Court of Vienna from religious scruples; joined the Swedish Army; and presently invented the leather guns. These statements are fully corroborated by a long series of writers, from Mauvillon a Frenchman who wrote in 1764,[2] down to Captain F. A Spak, of the Swedish Artillery, whose book was published recently.[3] The invention dates from 1627. The first trials of Wurmbrandt's leather guns, says Geijer, were made at the camp of Dirschau (near Dantzig) in September 1627[4] Rango, whose work was published about the same time as Geijer's, states that they were first used at the siege of Wormditt, October 1627[5],—as an experiment it may be presumed. The experiment was of course most unsatisfactory, as we gather from Dr. Salvius' letter to the Swedish Chancellor, Oxenstjerna, relative to a bullet wound the king had received in the shoulder, dated, Wormditt, 15 October, 1627:—"depuis quelques jours (le Roi) a été un peu contrarié par de mauvaises nouvelles, et par les canons de petit calibre qu'il a avec lui et qui ne produisent pas d'effet sur les gros murs".[6] Inventors, as a rule, are not wanting in confidence in their own productions; but great indeed must have been Wurmbrandt's assurance when he adventured his guns before the walls of Wormditt. What makes the incident all the more surprising is, that their usual projectile was case. They were not equal to the strain of a prolonged discharge of round shot. The value of case, in fact, was first clearly shown after their invention. Case and grape had probably been known since the end of the sixteenth century, but their use was only occasional until the introduction of the leather guns.[7] Whatever the true explanation, Wurmbrandt received a reward from the King for his invention,[8] a large part of which he lost immediately afterwards in a lawsuit brought against him by a clever Dutchman, Louis de Geer, for an infringement of his rights. In 1627 Geer entered into partnership with Mäster Wilhelm Giliusson, an iron-founder, and they obtained a concession from the Swedish Government for the exclusive manufacture of ordnance for six years (from 1627).[1] This privilege was infringed by Wurmbrandt, and he suffered accordingly.

---

[1] *Memoirs &c. of the reign of Charles I.* (*posthumous*), London, 1721; p. 100.

[2] *Hist. de Gustave Adolphe*, par M.D.M.; p. 124.

[3] "Ofversigt öfver Artilleriets Uppkomst och Utveckling &c", Stockholm, 1878–81.

[4] *Svenska Folkets Historia*, Orebro, 1832–6; III, 143, *note*.

[5] *Geschichte Gustav Adolfs*, Ronneburg; anhang, p. 51.

[6] *Lettres &c. de Gustave Adolf*, by Lindblom, trans. by Grimoard, Paris, 1790; p. 144.

[7] Spak, as before; p. 152.

[8] "*Biog. Lexicon*," as before. Wurmbrandt received 12,000 dal. (£950), and a grant of land.

The fact that a reward was given to Wurmbrandt by the King points clearly to two conclusions. First, the King did not invent the guns; secondly, he believed Wurmbrandt to have invented them. Weighing this very important fact with the many others previously mentioned, we may take it as quite certain that Freiherr von Wurmbrandt was the inventor of the leather guns the King used in his wars.[2]

The evidence for the fourth claimant has now to be examined.

In St. Mary's Church, Lambeth, there is the following epitaph:—

"Nere to this place lyeth interred the body of Robert Scott, Esq., descended of the ancient Barrons of Bawerie in Scotland. He bent himself to travell and studie much, and amongst many other things he invented the Leather Ordnance and carried to the King of Sweden 200 men, who after two years service for his worth and valour was preferred to the office of Qr.-Mr.-General of His Ma$^{\text{tie}}$ Army which he possessed three years: from thence with his favour he went into Denmarke (where he was advanced to the Generall of that King's Artillerie): theire being advised to tender his services to his own Prince, which he doinge His Ma$^{\text{tie}}$ willinglie accepted and preferred him to be one of ye Gent. of his most honorable Privie Chamber and rewarded him with a pension of £600 per annum: this deserving gentleman . . . surrendered his soule . . . 1631: &c."[3]

"In lapidary inscriptions a man is not on his oath," said Dr. Johnson. Let us verify, so far as we can, the various statements in this epitaph.

We have proof positive that a pension of £600 a year was settled on Scott by Charles I. The "Calendar of State Papers, Domestic Series," 1629–31, shows that "a grant of denization" was made to Col. Robert Scott, his wife and children, and his nephew James Wemyss (mentioned before as Colonel) on the 20th February, 1630; and on the same date there is another entry:—"Grant of pension of £600 to Col. Robert Scott." Five months previously the King had authorised the Attorney General to purchase Sir George Chute's house in Lambeth, "with a close of eight acres," for £1400, "the

---

[1] Spak, as before; p. 133.

[2] In stating that after the year 1629 the leather guns "disappeared" from the Swedish army, Col. Dodge ("*Gust. Adolphus,*" p. 44,) has overlooked or disregarded both Pomo's account of the battle of Leipsig, 7th September, 1631, already alluded to, and F. Spanheim (the elder)'s account of the same battle given in *Le Soldat Suèdois*, Rouen, 1634, p. 74. Spanheim says:—"l'Artillerie suèdoise (the ordinary iron guns) fut tellement eschauffée pendant le combat à force de tirer, qu'on ne la pouvait plus charger . . . Le Roi de Suède . . fit avancer ses pièces de cuir de nouvelle invention, s'en servit très utilement, perça le plus espais des troupes ralliées et de la Cavalerie ennemie, de sorte qu'elle quitta finalement la partie et fit jour par tout."
Spanheim was a well-informed and perfectly trustworthy man.

[3] *Riverside Churches*, A. E. Daniell; London, 1897; p. 146.

King's purpose being to place therein Col. Robert Scott for His Majestys' Service,"[1] *i.e.*, for the proof of ordnance. We have equally conclusive proof that Scott held the rank of 'Generalqvartermästare,'[2] and at one time or another commanded a Company of Scots[3] in the Swedish army. But did he invent the leather guns?

It is obvious that if the words "the leather ordnance" in the epitaph are used in their common and familiar sense, as equivalent to "the *Swedish* leather ordnance," either the evidence for Wurmbrandt is a tissue of falsehood, or the epitaph states a gross untruth. We are happily saved from this dilemma by a document deposited in the Swedish Secret Archives, quoted by a Swedish historian,[4] which shows very clearly that the words in question are not used in their usual sense, and that they are an abbreviation of the longer phrase,—"the leather ordnance used in the *English* service when this epitaph was written." In April or May, 1628, as appears from this document, Scott produced a leather gun at Stockholm, the exact construction of which he kept secret. This gun was only half the weight of Wurmbrandt's, and took a charge of one-half the weight of the shot while Wurmbrandt's could only take one-eighth[5] Other advantages were claimed for it by Scott, and in a letter to the King, 15th November, 1627, Count Jacob de la Gardie said he had seen Scott's gun make better practice than Wurmbrandt's;[6] but it was not adopted in the Swedish service, because Gustavus refused to pay the £1,500 asked by Scott for the secret.[7] On this, Scott took his leave with "His Ma^{tie} favour, and went into Denmarke."[8] It is perfectly clear, then, that the phrase "leather ordnance" in the epitaph does not refer to Wurbrandt's guns, on which doubtless Scott, as a rival inventor, looked with scorn; but to a gun of his own invention, offered to the King for a certain sum, and declined by his Majesty.

Of Scott's visit to Denmark only a few faint traces remain and these few we owe to the sagacity of an officer of Danish Artillery, Captain O. E. Blom. When examining the fragmentary, official, Danish records of the seventeenth century, he fell upon a mention of a 'lerstœcker' on the 2nd October, 1628, which, speaking "under all reserve," he suggests to be a corruption of 'lœderstykker,' or leather gun.[9] The epitaph (of which, of course, he knew nothing) completely confirms this brilliant conjecture. Scott was at work. His gun was under trial at Copenhagen in October, 1628; and again in January, 1629 there is an allusion to a leather gun, a "nye invention," a new invention. Scott's gun, which was still on its trial, could be described as a new invention in 1629 with far more propriety than Wurmbrandt's, which had been known since 1627; and what Norseman would have applied the English word 'invention' to Wurmbrandt's gun? The 'lerstœcker' was no doubt Scott's gun. But he seems to have had no better fortune in Denmark than in Sweden. His gun was not adopted by Christian IV: had it been, the fact could not have escaped Captain Blom's notice. And just at this moment Scott was advised to "tender his services to his own Prince, which he doing His Ma^{tie} willinglie accepted, &c., &c."

---

[1] *State Papers*, 3rd September, 1629.

[2] Cronholm's *Sveriges Historia under Gustaf II. Adolf*, Stockholm, 1857; II. 342, *note*.

[3] "Capit. Rob. Scotts Compagni" is mentioned in Wieselgren's *De la Gardiska Archivet*, Stockholm, 1831; XI., 36.

[4] Cronholm, as before quoted.

[5] There is some error here. The charge of Wurmbrandt's gun appears to have been $\frac{1}{3}$ to $\frac{1}{4}$ the weight of the shot.

[6] Cronholm, as before, "Tilläg och Rättelser."

[7] *i.e.*, 20,000 dal.

[8] He went to Denmark probably at the invitation of Krabbe, the Danish Ambassador at the Swedish Court, who had witnessed a trial of the leather guns.

[9] *Kristian den Fjerdes Artilleri*, Copenhagen, 1877; p. 223, *note*.

As soon as he found an opportunity Scott introduced his gun into the English service, while Sir Alexander Leslie (afterwards first Lord Leven) may have possibly introduced Wurmbrandt's into the Scotch. When Leslie gave up his command in the Swedish army in 1638, in order to return home, Queen Christina gave him 2000 muskets and two field pieces in lieu of pay.[1] Were these the leather guns he used with such triumphant effect at Newburn, near Newcastle-upon-Tyne, in 1640?[2]

Weymss succeded to the office held by Scott, and a warrant was issued on the 26th February, 1633, "for carrying such quantity of earth to Mr. Wemyss' garden at Vauxhall as should suffice for making a butt to prove ordnance."[3] But he does not seem to have succeeded to the emoluments of the office. On the 9th July, 1637, he presented a petition to Government in which he expresses his "fear of being cast into prison by his creditors." He reminds them that he has advanced £1,100 out of his own pocket, and prays that "he be not in a worse estate than the mackannikest (*sic*) man that serves the King, as he has these seven years without receiving a penny."[4] He was appointed Master-Gunner of England shortly afterwards, and in a report to Government, 10th September, 1638, he "regrets to say that there are few gunners in the kingdom, at this time, who understand the several ranges of ordnance or use of the mortar, which in effect are the special points belonging to a gunner and impossible to attain unto without a great and continued practice."[5] After he had been taken prisoner at Copredy Bridge, Lord Essex wrote to the Parliament urging that he should be speedily exchanged at any cost:—"a man of his abilities is not to be lost."[6] On the restoration Wemyss was reappointed to his former office; but, notwithstanding his abilities, he was suffered to end his days miserably. Shortly before his death he wrote a letter asking for his 'demission' to Charles II, dated

---

[1] *Dict. of National Biog.*, art "Alex Leslie."

[2] Bishop Burnet's *Hist. of my own Times*, Bk. I.

[3] *State Papers*, as before.

[4] *State Papers.*

[5] *Ib.*

[6] *Ib.* 15 July, 1644. The action was fought on the 29th June.

29 November, 1666, which concludes as follows :—

. . . "he" (i.e. Wemyss himself) "hath nothing from your "Majestie in this his old age to maintain him with, which forceth him, "with your leave and favour, to retire to a private life (how mean so-"ever), where he shall daily pray for your Majestie's long and prosper-"ous raigne.

"And remaine your Majestie's
most humble bot ruined servant
James Wemyss."[1]

To return to the leather guns :—when we reflect that Wemyss probably wrote, or assisted in writing, his uncle's epitaph, we feel how groundless is Bulstrode's assertion that Wemyss invented the leather guns.

Did his epitaph simply state that Scott invented *a* leather gun, it would be perfectly intelligible and secure from criticism. As it stands, it could hardly be more misleading. By the juxtaposition of the two phrases "the King of Sweden" and "the leather ordnance," as well as by the vagueness of the latter phrase, it *appears* to attribute deliberately to Scott the invention of the Swedish leather guns, which he himself would have been the first to disclaim. The guns invented by Scott were used, not in the Thirty Year's War by the King of Sweden, but by the Earl of Essex in the Great Rebellion.

The majority of military writers seem to accept substantially the estimate of the leather guns formed by the Emperor Napoleon III:— "ces canons . . . n'ont aucune intérêt au point de vue de l'histoire de l'artillerie."[2] I venture to question the soundness of this judgment. In shooting power the leather guns were confessedly inferior to metal ones; but it was only when they appeared in the field that soldiers first realised, however imperfectly, the importance of another attribute of Field Artillery, mobility. These guns were short-lived, it is true; but when they disappeared their work was done. They had afforded the first faint indications of what might be achieved by a Field Artillery that could move quickly as well as fire effectively. Owing to the backward state of Chemistry and Metallurgy, the construction of such a system was impossible in the time of Gustavus Adolphus; and it was not, in fact, accomplished for more than a century after his death. The creation of Horse Artillery in the eighteenth century by the great King of Prussia was the counterpart of the introduction of the leather guns in the seventeenth century by the yet greater King of Sweden.

---

[1] Sir William Fraser's *Memorials of the family of Wemyss,* Edinburgh, 1880; II, 247.

[2] *Etude sur le passé, etc., de l'Art.;* I., 339.

INDEX.—VOL. XXV.

LIBRARY
JAN 20 1899
U. S.
PATENT OFFICE

PAGE

A

Arnold-Forster, H. O., Esq., M.P. Recruiting, a Lecture ... 53
〃 Introductory ... 53
〃 Quality of recruits ... 55
〃 The Terms we offer ... 55
〃 "Specials" ... 56
〃 How not to attract recruits ... 57
〃 The infantry recruit—characters ... 61
〃 Plea for more colour in soldier's life ... 63
〃 Lines of possible reform ... 65
〃 Learning a trade ... 67
〃 Discussion ... 70
〃 Reply ... 77
Armour, the development of, 1893–98. By Captain C. Orde Browne 463, 509, 549, 585
Automatic sighting. By Colonel H. S. S. Watkin, C.B. ... 269
Askwith, General W. H., R.A., Memoir of ... 97

B

Ballard, Lieut. C. N. B., R.A. Diary of 10th F.B. R.A., in Malakand ... 419
Bunker's Hill, an account of (Downman) ... 103
Barlow, Captain H. W. W., R.A. Commended Essay ... 337
〃 Essentials of Q.F. equipment ... 339
〃 Maximum rate of fire ... 341
〃 Alleged disadvantages ... 345
〃 Appendix ... 354
Buckle, Lieut. A. S., R.A. Commended Essay ...
〃 Introduction ... 357
〃 Advantages and disadvantages ... 358
〃 Fire discipline with Q.F. guns ... 365
〃 Q.F. equipments ... 367
〃 Summary ... 371
Beresford, Rear-Admiral *Lord* C., C.B., R.N. Discussion Q.F. field ... 455
Bombardiers Stokes and Crosier at Narva (Dalton) ... 16
Boys, C. V., Esq., F.R.S. Chairman von Donop's lecture, 385, 406, 408, 409, 412
Brett, Captain W. P., R.E. Wireless Telegraphy, a lecture ... 111
〃 Preece's system ... 113
〃 Marconi's system ... 117
〃 Hertz's demonstration ... 118
〃 Coherer, description of ... 120
〃 Discussion ... 126
〃 Reply ... 126, 131

PAGE

C

Cleeve, Captain, F. J. S., R.A. Discussion Recruiting ... 76
〃 A system of comparing geographical distances ... 133
Clarke, Colonel *Sir* G. S., K.C.M.G. Discussion Q.F. field ... 449, 460
Cover question, a short summary of the. By Major J. L. Keir, R.H.A. ... 39
Clavering, Brig.-General's account of. Capture of Guadeloupe (Downman) ... 7

D

Dalton, Charles, British gunners at the siege of Narva ... 15
〃 Lieut.-Colonel, J. C., R.A. Salmon fishing in Eastern Canada ... 85
〃 Rivers in do. ... 86
〃 Tackle, etc. ... 87
〃 Mode of fishing ... 89
〃 Cost ... 90
〃 Outfit ... 91
〃 Mosquitoes, etc. ... 94
〃 Megaphone, the ... 231
Dargai, the Artillery at. By Lieut. G. F. MacMunn, D.S.O., R.A. ... 173
Dashwood, Major-General R. Discussion Recruiting ... 77
Davidson, Lieut.-Colonel, W. L., R.H.A. Discussion Recruiting ... 77
Dawson, Lieut. A., R.N. Discussion Q.F. field ... 452
Diary of 10th F.B., R.A., in Malakand. Lieut C. N. B. Ballard R.A. ... 419
Downman, the services of Lt.-Colonel Francis, R.A., etc. By Colonel F. A. Whinyates. Parts and Chapters, 1, 45, 101, 153, 209, 235, 373, 429, 493, 529, 565 ...
〃 America, sails for ... 101, 107
〃 Appendix follows ... 429
〃 Battle of Brandywine ... 157
〃 〃 Bunker's Hill ... 103
〃 〃 Freehold ... 240
〃 〃 Monmouth Courthouse 240
〃 〃 Mud Island ... 212
〃 Capture of St. Lucia ... 434
〃 Delaware, action with the ... 161
〃 Fleets, *Lord* Howe's and d'Estaings 244
〃 〃 Movements of ... 375, 529
〃 French attack the Vigie ... 494
〃 〃 capture Grenadines ... 566

PAGE

Downman French attack St. Vincent 565
〃 〃 leaves St. Lucia 502
〃 at Guadeloupe 4
〃 promoted captain 572
〃 Summary of his services 2
Dunkerley, Professor S., M.Sc. Discussion Ewing 264

E

Egypt, 1798–9. Documents relating to. By Lt.-Colonel H. W. L. Hime 179
Elephant equipment, 12-pr. gun with. By Captain W. B. R. Sandys, R.A. ... 225
Elmslie, Major F. B., R.A. Silver medal prize essay 287
〃 Characteristics of Q.F. guns 288
〃 Advantages of Q.F. equipment ... 290
〃 Disadvantages 〃 〃 293
〃 Balance between advantages and disadvantages 300
〃 Conclusion 302
〃 Appendix 303
〃 Letter in Q.F. field discussion ... 439
Enthoven, Major P. H., R.A. Marching through jungle across India 559
Ewing, Professor J. A., F.R.S. The teaching of mechanics by experiment 249
〃 Discussion 263
〃 Reply 267

F

Fuze, on failures at practice with T. and P. Mark IV. By Major W. A, Urquhart, R.A. 539

G

Gavey, T. Esq. Discussion (Brett) 127
General Meeting, Sixty-first Annual... 277
Geographical distances, a system of comparing. By Captain F. J. S. Cleeve, R.A. ... 133
"Gonne" or "gun," on the word. By Lt.-Colonel H. W. L. Hime 485
Greenhill, Professor A. G., F.R.S. Discussion (Ewing) 265
〃 Discussion (von Donop) 408
Guadeloupe (Downman) 5, 11
Guns into action, method of bringing. By Major-General T. B. Tyler 35

H

Hale, Col. Lonsdale A. Discussion Q.F. field 457
Hime, Lt.-Colonel H. W. L. Documents relating to Egypt, 1798–9 179
〃 On the word "Gonne" or "Gun" 485
〃 Who invented the leather guns 595
Holden, Major H. C. L., F.R.S. Discussion von Donop's lecture 405

PAGE

I

Inglefield, Major N. B., R.A. Silver medal prize essay 307
〃 Equipment 308
〃 Tactical employment of Q.F. guns 311
〃 Q.F. with corps Artillery... 321
〃 Conclusion 322

J

Jeffreys, Major H. B., R.A. Discussion Q.F. field 441

K

Keir, Major J. L., R.H.A. A short summary of the cover question... 39
Kelly, Major R. M. B. F., R.A. Discussion (Brett) 126
〃 Outposts for coast defence 147
Kennesby. Fireworker, R.A. At Narva (Dalton) 16
Kilgour, Lieutenant-Colonel H. Discussion Recruiting 7
Kinglake's narrative, observations on. By Col. F. A. Whinyates 527
Kough, Lieut. T. M., R.A. Artillery in the Rebellion of 1798 413
〃 Arklow and Vinegar Hill... 415
〃 List of events 417

L

Lloyd, Major-General F. T., C.B. Chairman Brett's lecture 111, 131
Lloyd, Captain M. B., R.A. Discussion von Donop's lecture 406
Lockhart, Colonel R. D. E. Discussion (Recruiting)... 70

M

MacMahon, Major P. A., F.R.S. Chairman Ewing's lecture. 249
〃 Conclusion 266
MacMunn, Lieut. G. F. D.S.O., R.A. The Artillery at Dargai 173
〃 Attack of 18th and 20th October 174
〃 Description of artillery fire 176
Manœuvres of the XIV. German Army Corps, 1897. By Colonel A. E. Turner, C.B. 185
Mansell, Captain J. H., R.A. Practice Seawards 489
Marching through jungle across India. By Major P. H. Enthoven, R.A.... ... 559
Maurice, Maj.-General J. F., C.B. Chairman (Recruiting)... ... ... 53, 78
〃 Chairman (Cleeve) 133, 143
〃 Chairman Q.F. discussion ...439, 457
Mechanics, the teaching of by experiment. By J. A. Ewing, Esq., F.R.S. 249

PAGE

Megaphone as a Garrison Artillery adjunct. The. By Lt.-Col. J. C. Dalton, R.A. 231
Memoir of General W. H. Askwith, R.A. ... 97
Methuen, Lieut.-General the *Lord*. Discussion Q.F. Field Artillery 439
Militia Field Artillery. By Captain J. C. Wray, R.A. 29
Montgomery, Captain R. A. K., R.A. Commended Essay Advantages to be gained 326
〃 Disadvantages of Q.F. guns ... 331
〃 Conclusion 334
Morris' tube practice. By Lieutenant G. C. Sturrock, R.A. 505

N

Narva, British gunners at the siege of. By Charles Dalton, Esq. 15
Norris, Capt. E. E., R.A. Discussion Recruiting 71

O

Orde Browne, Captain C. The development of armour, 1893–98. 463, 509, 549, 585
Outposts for coast defence. By Major R. M. B. F. Kelly, R.A. 147

P

Position and work of artillery in the field, remarks on. By Brig.-General C. H. Spragge, C.B. 19
Practice seawards. By Capt. H. Mansell, R.A. 489

Q

Q.F. guns for artillery in the field, advantages and disadvantages of. Essays, 1898
〃 Silver medal, Major Elmslie 287
〃 Silver medal, Major Inglefield ... 307
〃 Commended, Captain Montgomery 325
〃 Commended, Captain Barlow... ... 337
〃 Commended, Lieutenant Buckle ... 357
Q.F. field artillery fire. By Lieut. C. H. Wood, R.H.A. 523

R

Rebellion of 1798. The artillery in the. By Lieut. T. M. Kough, R.A. 413
Reconnaissance by artillery. By Brig.-Genl. C. H. Spragge, C.B. 579
Recruiting, a lecture. By H. O. Arnold-Forster, Esq., M.P. 53
Richardson, Maj.-Genl. J. B. Discussion Q.F. field 445
Röntgen Rays up-to-date. Précis of lecture. By W. Webster, Esq. 545

S

Salmon fishing in Eastern Canada. By Lieut.-Colonel J. C. Dalton, R.A. 85
Sandys, Captain W. B. R., R.A. 12-pr. gun with elephant equipment 225
Sandys. Drill of 227
〃 Equipment 228
〃 Animals 229
〃 Noticeable points 229
Spragge, Brig.-General C. H. Remarks on position and work of artillery in the field 19
〃 Formations 20
〃 Positions 22
〃 Schemes of skeleton work 26
〃 Reconnaissance by artillery 579
Sturrock. Lieut. G. C., R.A. Morris' Tube practice... 505

T

Turner, Colonel A. E., C.B. Discussion Recruiting 72
〃 Manœuvres in Germany, 1897... ... 185
〃 General observations... 202
〃 Artillery 203
〃 〃 letter on method of coming into action 204
〃 military balloon 205
Tyler, Major-General T. B. Method of bringing guns into action 35

U

Urquhart, Major W. A. On failures at practice with T and P fuze Mark IV. 539

V

von Donop, Major S. B., R.A. Discussion Ewing 263
〃 Mechanism of bicycles, lecture on, 385
〃 Discussion 405
〃 Reply 412

W

Watkin, Colonel H. S. S., C.B. Automatic sighting... 269
Webster, W. Esq., F.C.S. Précis of lecture on Röntgen rays up-to-date 545
Whinyates, Col. F. A. The services of Lieut.-Col. Francis Downman, R.A., etc. 1 45, 101, 153, 209, 235, 373, 429 493, 529, 565 ... ...
〃 Observations on Kinglake's Narrative... 527
Who invented the leather guns? By Lt.-Col. H. W. L. Hime 595
Wilson, Lieut. C. H., R.A. Discussion Q.F. field 447
Wireless telegraphy, a lecture. By Captain W. P. Brett, R.E. 111
〃 Discussion 126
Wood, Lieut. C. H., R.H.A. Q.F. Field Artillery fire 523
Wray, Captain J. C., R.A. Militia Field Artillery 29

Y

Yorke, Lieut.-Colonel F. A., R.A. Discussion (Recruiting)... 71

NOTES
FROM
CORRESPONDING MEMBERS.

"DUNCAN" GOLD MEDAL PRIZE ESSAY, 1898.

The Subject approved by H.R.H. The Colonel-in-Chief for the "Duncan" Gold Medal Prize Essay, 1898, is as follows:—

"The advantages and disadvantages of Q.F. guns for Artillery in the field."

The Rules for the Prize Essays now read:—

The Annual Gold Medal, when awarded, to be accompanied by an *honorarium* of £20; the Silver Medal by an *honorarium* of £10.

The candidates must be Officers of the Regiment who are members of the R.A. Institution.

Officers are requested to confine their Essays to about 16 printed pages of the "Proceedings;' other things being equal, brevity will count towards success.

The Essays must be forwarded to the Secretary so as to reach him on or before the 1st of April.

Each Essay must be *type-written* in triplicate. The Essays must be strictly anonymous, but each to have a motto, and be accompanied by a sealed envelope with the motto written outside and the name of the writer inside; further, if the writer wishes to recover from the Committee part of the cost of type-writing his Essay he should state this fact in the same sealed envelope and write outside it, above the motto, "to be opened."

All the envelopes thus marked will be opened by the Secretary after the result of the competition has been announced, and he will send the writers the money for their type-writing expenses.

The Committee will allow a sum of £1 for type-writing each Essay.

The Essays will be submitted for decision to three Judges chosen by the Committee.

The Judges are empowered to recommend:—

1. That two Medals, one Gold and one Silver, be awarded, or
2. That only one Medal, Gold or Silver, according to the merit of the Essay, be awarded, or
3. That no Medal be awarded.

The names of the successful candidates will be announced at the Annual Meeting, and Medallists will be distinguished as such in all Lists, &c., issued from the Institution; and in the event of a University man gaining a Medal, a report of his success will be made to the University of which he may be a member.

The successful Essays will be printed and circulated to members by the Institution.

N.B.—The Committee draw particular attention to the paragraph in the Rules above on the subject of length of Essays; it is not difficult to discover the number of words in an average page of "Proceedings" matter, and so to keep an Essay within the 16 pages' limit.

The following works are now on sale at the R.A. Institution and will be forwarded post free at the prices noted after their titles below:—

"Twenty-four hours of Moltke's Strategy" by Fritz Hoenig. Translated by Colonel N. L. Walford, price 5s.

"The Shrapnel Fire of the Field Artillery" by Major-General Rohne. Translated by Colonel N. L. Walford, price 2s. 6d.

Major-General Stubbs's "List of Officers of the Bengal Artillery," price 5s. 3d.

"Field Artillery Fire," by Captain W. L. White, R.A., price 1s. 2d.

"Ranging Note-Book," by Captain S. W. Lane, R.A., price 1s. 1d.

"Achievements of Field Artillery," by Major E. S. May, R.A., bound, price 2s. 6d.

"The Value of Mobility for Field Artillery," by Major E. S. May, R.A., paper covers, price 3d.

"The Young Officer's 'Don't,' or Hints to Youngsters on Joining," by an Officer R.A., price 7d.

Examination questions in (*c*), (*d*) and (*e*) set in the five examinations ending November 1897:—

Captains (*c*) and (*d*) ... ... price 1s. 1d.
Lieutenants (*c*), (*d*) and (*e*) ... price 1s. 1d.

Tables of Four-Figure Logarithms, pocket edition, mounted on linen, price 3d.

"Notes on the early history of the Royal Regiment of Artillery," by the late Colonel Cleaveland, R.A., price 2s.

List of additions to the Library during the month of December, 1897.

PRESENTED.	BY WHOM.
Notes on Mechanism, as applied to artillery. By Capt. S. B. von Donop, R.A.	Secretary of State.
Arrangements for the supply of ammunition, targets, and other stores for the practice of Royal Horse and Field Artillery in Ireland for the year 1898.	
Report on the examination for admission to the Staff College held in August 1897, with copies of the examination papers. ...	D.G. of M.E.
Report on the sixteenth senior class at the Artillery College, 1897. 12 copies.	Director Artillery College.
Minutes of proceedings of the Institution of Civil Engineers. Vol. CXXX. Part 4, 1896-7.	The Council

Netherlands Artillery atlas. Plates 119 to 124 and 240 to 245	Netherlands Government
Large explosions and their radii of danger. By Lieut.-Col. J. F. Bucknill, late R.E....	The Author.
Books of views of the Bosphorus.	Major H. C. C. D. Simpson, R.A
Copy of an address by Dr. Hunter McGuire, delivered on 23rd June, 1897, at the Virginia Military Institute, upon the occasion of the inauguration of the "Stonewall" Jackson Memorial Building.	Capt. W. Gordon McCabe.
A practical course of artillery (M.S.). By P. J. S. Barry, 1837.	E. D. Davies, Esq.
Report on the tactical operations, South Eastern District, 1897.	Col. F. G. Slade, C.B., R.A.
Indian frontier policy; an historical sketch. By General Sir John Adye, G.C.B., R.A.	The Author.
Notes on artillery store accounts 1897.	Staff-officer Artillery College.

MUSEUM.

R.L. shot, armour piercing 6-in.; after perforating 9-in. water hardened steel plate and 3 feet oak, 25.9.96................	Ordnance Committee.

PURCHASED.

Kriegsgeschichtliche Beispiele aus dem Deutsch-Französischen Kriege von 1870-1. Part 6.

Campaigns of the army of the Potomac, 1861–65. By William Swinton, New York, 1882.

Queen Victoria (illustrated). By Richard R. Holmes, F.S.A., Librarian to the Queen.

Schlachten Atlas. Part 54.

Biologia Centrali-Americana. Zoology. Part 138.

History of the campaign of General T. J. "Stonewall" Jackson in the Shenandoah Valley of Virginia, from 4th Nov., '61 to 17th June, '62. By Wm. Allan.

Letters on applied tactics. By Major Griepenkerl.

Electric light; its production and use. By J. W. Urquhart.

Guillaume II., Intime. Par Maurice Leudet.

Photograph of German war balloon, 1897.

Aufzeichnungen des Prinzen Kraft zu Hohenlohe-Ingelfingen. Aus Meinem Leben. Berlin, 1897.

English-German Dictionary. Vols. I. and II., and Dutch-English Dictionary. Vols. I., II. and III. By Professors Muret and Sanders. Berlin, 1897.

Book of eighty-seven figures, shewing all the motions in the manual and platoon exercises and the different firings. Drawn from life by Capt. T. L. Mitchell, Queen's Royals. 2nd edition, 1835.

A full, accurate, and impartial history of the campaign from the beginning of January, 1794, down to the present time. 1794.

Histoire abregée des Provinces-Unies des Pais-Bas, où l'on voit leurs progrés, leurs conquêtes, leur Gouvernement, et celui de leurs compagnies en Orient et en Occident. Amsterdam, 1701.

History of the Dress of the Royal Artillery.

FOR the last two months and more notices have gradually been sent out to officers of the Regiment and others likely to be interested calling attention to the approaching publication of the History of the Dress of the Royal Artillery. Notices on the subject have appeared previously in either the R.A.I. "Proceedings," these notes, or in circular letters, but it is as well to remind officers of the information they gave, briefly as follows:—

Captain R. J. Macdonald, R.A., has for some years devoted all his spare time first, to the acquirement of information bearing on the subject; for this purpose he has consulted The British Museum, Military Institutions and Libraries, artists and private collectors of military work; next, to the perfecting of himself in the artistic reproduction of the information thus gained. The Committee of the R.A.I. have satisfied themselves that Captain Macdonald's work is certainly better than that of any similar publication they have seen and think that when reproduced by a process like that used for the specimen plate lately sent out, guarantors and subscribers will receive in their 25 coloured plates very good value for their money.

The book will contain a few sheet plates in black and white.

The letterpress will be enough to explain each plate, quoting authorities for its construction, and perhaps give a few references to Kane's List so as to show the dress worn by various distinguished old time officers of the Artillery.

As soon as officers have had a reasonable time to fill in and send back the subscription forms, the subscription list will be closed; the price of the unsubscribed copies of the edition will be 30/- each. Anyone wishing to see a specimen or to have another subscription form sent to him should apply to the Secretary, R.A.I.

Publication will be proceeded with directly the subscription list is closed and the Committee hope to be able to send copies to guarantors early in the summer of 1898.

Several subscribers have asked for copies containing the plates loose, so probably the book will be published with the plates not bound in.

Obituary.

THE Committee of the Royal Artillery Institution feel that they are expressing the heartfelt sympathy of the whole Regiment with the widow and family of GENERAL W. H. ASKWITH, Colonel-Commandant, for the loss they have sustained by his death at St. George's Square, on 25th November, 1897.

The Committee hope to publish at an early date a memoir which will do justice to the great services rendered to his Regiment, and to the Royal Artillery Institution, by the late General.

MAJOR E. CASSAN, who died at St. John's, S.E., on 26th November, 1897, was first commissioned as Lieutenant, 12th Sept., 1872; became Captain, 1st Nov., 1881, and Major, 11th Jan., 1889. Major Cassan served during the operations in Chitral, 1895. He was placed on temporary half-pay owing to ill-health, 18th June, 1897.

GENERAL *Sir* H. L. GARDINER, K.C.V.O., C.B., Col.-Comdt., died at Thatched House Lodge, Richmond Park, 15th Dec., 1897, He joined the Regiment as 2nd Lieutenant, 14th Dec., 1837; became Lieutenant, 16th March, 1840; 2nd Captain, 9th Nov., 1846; Captain, 22nd March, 1853; Brevet-Major, 20th July, 1855; Lieut.-Colonel, 9th Aug., 1858; Colonel, 9th Aug., 1863; Major-General, 30th April, 1869; Lieut.-General, 26th Nov., 1880; General, 1st Oct., 1882, and Col.-Comdt., 7th Nov., 1884 and Col-Comdt. R.H.A., in 1895. Sir Lynedoch Gardiner served during the Canadian Rebellion, 1838; Indian Mutiny, 1858, including the pursuit of Tantia Topee, in Central India. He was A.-A.-G. R.A. from July, 1863, to Jan., 1868; was appointed Groom-in-waiting to the Queen, 1869; was extra equerry from 1872 to 1896, and subsequently held both offices in Her Majesty's household. He was appointed a civil C.B. 21st June, 1887, was Bath King at Arms, and was made a K.C.V.O. 30th Jan., 1897.

Born in the Regiment, the son of Sir Robert Gardiner, one of its most distinguished officers, Sir Lynedoch was intensely devoted to the Royal Artillery and had looked forward to the celebration of the Diamond Jubilee of his service, which occurred the day before he died. His funeral at Esher was attended by many officers, N.C.O.'s and men of the Royal Horse Artillery, the coffin being carried on a gun of 'G' Battery in which Sir Lynedoch had served as a Subaltern. By his death the R.A. Institution loses another sincere friend.

CAPTAIN J. C. J. LOWRY, (retired) whose death occurred at Dungannon, on 9th Dec., 1897, received a direct commission as Lieutenant, 24th Sept., 1855; became 2nd Captain, 27th Sept., 1864 and retired on an annuity 21st Oct., 1871.

MAJOR E. A. SMITH, whose death is announced as having occurred at Jamaica, 2nd Nov., 1897, was commissioned as Lieutenant 12th Feb., 1874; became Capt., 7th July, 1883; Brevet-Major, 23rd Aug., 1889; and Regimental Major, 16th Feb., 1891. Major Smith served during the Jowaki Expedition, 1877–78. Medal with clasp. Afghan War, 1878-80. Actions of Matun, Charasia and Lataband; operations near Kabul, skirmish at Surobi, march from Kabul to relief of Kandahar, and battle of 1st Sept. Despatches, *London Gazette* 16th Jan., 4th May, and 3rd Dec., 1880. Medal with 2 clasps; bronze star. Burmese Expedition, 1888-9. Despatches, *London Gazette* 15th Nov., 1889, Brevet of Major.

NOTES
FROM
CORRESPONDING MEMBERS.

"DUNCAN" GOLD MEDAL PRIZE ESSAY, 1898.

The Subject approved by H.R.H. The Colonel-in-Chief for the "Duncan" Gold Medal Prize Essay, 1898, is as follows :—

"The advantages and disadvantages of Q.F. guns for Artillery in the field."

The Rules for the Prize Essays now read :—

The Annual Gold Medal, when awarded, to be accompanied by an *honorarium* of £20; the Silver Medal by an *honorarium* of £10.

The candidates must be Officers of the Regiment who are members of the R.A. Institution.

Officers are requested to confine their Essays to about 16 printed pages of the "Proceedings;' other things being equal, brevity will count towards success.

The Essays must be forwarded to the Secretary so as to reach him on or before the 1st of April.

Each Essay must be *type-written* in triplicate. The Essays must be strictly anonymous, but each to have a motto, and be accompanied by a sealed envelope with the motto written outside and the name of the writer inside; further, if the writer wishes to recover from the Committee part of the cost of type-writing his Essay he should state this fact in the same sealed envelope and write outside it, above the motto, "to be opened."

All the envelopes thus marked will be opened by the Secretary after the result of the competition has been announced, and he will send the writers the money for their type-writing expenses.

The Committee will allow a sum of £1 for type-writing each Essay.

The Essays will be submitted for decision to three Judges chosen by the Committee.

The Judges are empowered to recommend :—

1. That two Medals, one Gold and one Silver, be awarded, or
2. That only one Medal, Gold or Silver, according to the merit of the Essay, be awarded, or
3. That no Medal be awarded.

The names of the successful candidates will be announced at the Annual Meeting, and Medallists will be distinguished as such in all Lists, &c., issued from the Institution; and in the event of a University man gaining a Medal, a report of his success will be made to the University of which he may be a member.

The successful Essays will be printed and circulated to members by the Institution.

N.B.—The Committee draw particular attention to the paragraph in the Rules above on the subject of length of Essays; it is not difficult to discover the number of words in an average page of "Proceedings" matter, and so to keep an Essay within the 16 pages' limit.

THE following works are now on sale at the R.A. Institution and will be forwarded post free at the prices noted after their titles below:—

"Twenty-four hours of Moltke's Strategy" by Fritz Hoenig. Translated by Colonel N. L. Walford, price 5s.

"The Shrapnel Fire of the Field Artillery" by Major-General Rohne. Translated by Colonel N. L. Walford, price 2s. 6d.

Major-General Stubbs's "List of Officers of the Bengal Artillery," price 5s. 3d.

"Field Artillery Fire," by Captain W. L. White, R.A., price 1s. 2d.

"Ranging Note-Book," by Captain S. W. Lane, R.A., price 1s. 1d.

"Achievements of Field Artillery," by Major E. S. May, R.A., bound, price 2s. 6d.

"The Value of Mobility for Field Artillery," by Major E. S. May, R.A., paper covers, price 3d.

"The Young Officer's 'Don't,' or Hints to Youngsters on Joining," by an Officer R.A., price 7d.

Examination questions in (*c*), (*d*) and (*e*) set in the five examinations ending November 1897:—

Captains (*c*) and (*d*) ... ... price 1s. 1d.
Lieutenants (*c*), (*d*) and (*e*) ... price 1s. 1d.

Tables of Four-Figure Logarithms, pocket edition, mounted on linen, price 3d.

"Notes on the early history of the Royal Regiment of Artillery," by the late Colonel Cleaveland, R.A., price 2s.

GIBRALTAR.

THE regimental pantomime has again been an unqualified success; written by Major F. B. Toms and arranged to music by Lieut. M. W. McCheane it was given every night of the week 10th to 15th January with a matinée on the Thursday. The various parts were filled by officers and men of the Regiment or members of their families, and although the weather was unfavourable it always drew good houses. The "Babes in the Wood" was the title, but the original tale was somewhat expanded as King Richard, Blondel, Robin Hood and his family, Little John, Maid Marian and others all appeared on the scene. The opportunity was taken to make good use of local talent; for in scene VI, at the archery bout in honour of the King, an entertainment was introduced in which was some excellent Spanish dancing; the other shows being a most graceful skirt dance by Maid Marian and a Ballet of Seasons by children.

There were no less than nine scenes and a harlequinade full of songs, dances and fun from beginning to end. The *Gibraltar Chronicle* says: "The scenery, staging, and limelight effects of the pantomime are the best we have seen here, and we heartily congratulate Capt. T. F. Cooper and the whole company on the success which has attended their efforts."

List of additions to the Library during the month of January, 1898.

PRESENTED.	BY WHOM.
Field Artillery Service Hand-book, 1897. 2 Copies.....................................	Secretary of State.
Annual Report of the School of Gunnery, 1897. Horse and Field Artillery at Home.	
Regulations for the Volunteer Force, 1897.	
Instructions for practice, Siege Artillery, 1898	
Colored Lithographs, R.C.D., 237, 246, 247 and 248. R.L., 245, 246, 248 and 249.	
Examination papers, Artillery College, 1895-6 and 1896-7..................................	Director of Artillery College.
Sixteenth Annual Report of the Bureau of American Ethnology; 1894-5..............	The Director.
The Campaign between the Prussians and the Austrians in 1866; by T. M. Maguire, LL.D., and Captain W. V. Herbert.; with supplementary remarks on Tactics; by Lieutenant Bürde, Prussian Army. 2nd Edition, London 1897. 2 Copies..........	T. M. Maguire, Esq., LL.D.
Two bound volumes of MSS, and one parcel of MS Notes; by General W. H. Askwith Col.-Comdt., R.A............................	Captain J. B. H. Askwith, R.H.A.

PURCHASED.

Petit Dictionnaire Militaire-Francais-Allemand et Allemand-Francais; par W Stavenhagen. Part I. 1 Vol., Paris, 1897.

A Dictionary of French and English military terms; by Albert Barrère. Part II French—English.
Dictionary of National Biography. Vol. 53.
The Hakluyt Society's Publication, No 98, 1897: "The Christian Topography of Cosmos". 1 Vol.
Navy Records Society's Publication, 1897; "The French War of 1512–13". 1 Vol.
Biologia Centrali-Americana—Zoology, Part 139.
German-English Dictionary, Part IV.; by Professors Muret and Sanders: Berlin, 1897.

Obituary.

LIEUT.-COLONEL R. A. C. KING, who died at Madras on 6th December last, was first commissioned as Lieut., 15th December, 1871, became Captain, 1st July, 1881; Major, 28th September, 1887, and Lieut.-Colonel, 18th May, 1897. Lieut-Colonel King served during the Afghan war, 1878-9, and was present at the affair of Baghao (despatches, *London Gazette*, 7th November, 1879, medal); Hazara Expedition, 1888 (mentioned in despatches, medal with clasp).

COLONEL S. C. KYLE (retired), died at Queenstown, 4th January, 1898. He joined the regiment as Lieut., 10th August, 1856; became 2nd Captain, 16th December, 1867; Captain, 5th July, 1872; Brevet-Major, 15th January, 1876; Lieut.-Colonel, 15th January, 1883, and retired with the hon. rank of Colonel, 17th August, 1884. Colonel Kyle served during the Indian Mutiny, 1857-8, and was present at the actions of Secundra, Chanda, and Sultanpore, siege and capture of Lucknow, relief of Azimghur and capture of Judgespore (despatches, *London Gazette*, 25th May, 1858, medal with clasp).

CAPTAIN J. R. C. SCLATER (retired), who died on 27th December, 1897, was commissioned as Lieut., 15th July, 1868; became Captain, 27th August, 1879, and retired with a gratuity 26th April, 1882.

CAPTAIN J. A. THORNTON, whose death occurred at Bermuda, 18th November, 1897, joined the regiment as 2nd Lieut., 16th February, 1887; became Lieut., 16th February, 1890, and Captain 1st September, 1897.

MAJOR-GENERAL A. G. YEATMAN-BIGGS, C.B., died at Peshawar, 4th January; 1898. He was first commissioned as Lieutenant., 18th December, 1860; became Captain, 14th February, 1874; Brevet-Major, 24th July, 1880; Brevet-Lieut.-Col. 18th November, 1882; Colonel, 18th November, 1886, and Major-General, 16th June, 1897. General Yeatman-Biggs was Brigade-Major, R.A., Aldershot, August, 1884 to December, 1888; A.A.G., Head-Quarters, India, 4th January, 1894 to 31st March, 1895, and Brigadier-General Commanding the Presidency District, 1st April, 1895 until October, 1897.

Major-General Yeatman Biggs served during the operations against the Taeping rebels, China, 1862, and was present at the capture of Kahding; in the South African War, 1879 (Zulu Campaign) he commanded one of the parties sent in pursuit of Ketchwayo, and was subsequently engaged in the operations against Sekukuni as staff officer of the Lydenburg column (despatches, medal with clasp, brevet of major). He served in the Egyptian Expedition, 1882, as Brigade Major, R.A. (despatches, *London Gazette*, 2nd November, 1882, medal, bronze star; brevet of Lieut-Colonel; 4th class Osmanieh). General Yeatman-Biggs was appointed a C.B., 30th May, 1891. In October, 1897, he was appointed to the command of the 2nd Division Tirah Expeditionary Force on the N. W. Frontier, India, and it was while engaged on this service that he contracted the illness which proved fatal.

NOTES

FROM

CORRESPONDING MEMBERS.

"DUNCAN" GOLD MEDAL PRIZE ESSAY, 1898.

THE Subject approved by H.R.H. The Colonel-in-Chief for the "Duncan" Gold Medal Prize Essay, 1898, is as follows :—

"The advantages and disadvantages of Q.F. guns for Artillery in the field."

The Rules for the Prize Essays now read :—

The Annual Gold Medal, when awarded, to be accompanied by an *honorarium* of £20; the Silver Medal by an *honorarium* of £10.

The candidates must be Officers of the Regiment who are members of the R.A. Institution.

Officers are requested to confine their Essays to about 16 printed pages of the "Proceedings; other things being equal, brevity will count towards success.

The Essays must be forwarded to the Secretary so as to reach him on or before the 1st of April.

Each Essay must be *type-written* in triplicate. The Essays must be strictly anonymous, but each to have a motto, and be accompanied by a sealed envelope with the motto written outside and the name of the writer inside; further, if the writer wishes to recover from the Committee part of the cost of type-writing his Essay he should state this fact in the same sealed envelope and write outside it, above the motto, "to be opened."

All the envelopes thus marked will be opened by the Secretary after the result of the competition has been announced, and he will send the writers the money for their type-writing expenses.

The Committee will allow a sum of £1 for type-writing each Essay.

The Essays will be submitted for decision to three Judges chosen by the Committee.

The Judges are empowered to recommend :—

1. That two Medals, one Gold and one Silver, be awarded, or
2. That only one Medal, Gold or Silver, according to the merit of the Essay, be awarded, or
3. That no Medal be awarded.

The names of the successful candidates will be announced at the Annual Meeting, and Medallists will be distinguished as such in all Lists, &c., issued from the Institution; and in the event of a University man gaining a Medal, a report of his success will be made to the University of which he may be a member.

The successful Essays will be printed and circulated to members by the Institution.

N.B.—The Committee draw particular attention to the paragraph in the Rules above on the subject of length of Essays; it is not difficult to discover the number of words in an average page of "Proceedings" matter, and so to keep an Essay within the 16 pages' limit.

The following works are now on sale at the R.A. Institution and will be forwarded post free at the prices noted after their titles below:—

"Twenty-four hours of Moltke's Strategy" by Fritz Hoenig. Translated by Colonel N. L. Walford, price 5s.

"The Shrapnel Fire of the Field Artillery" by Major-General Rohne. Translated by Colonel N. L. Walford, price 2s. 6d.

Major-General Stubbs's "List of Officers of the Bengal Artillery," price 5s. 3d.

"Field Artillery Fire," by Captain W. L. White, R.A., price 1s. 2d.

"Ranging Note-Book," by Captain S. W. Lane, R.A., price 1s. 1d.

"Achievements of Field Artillery," by Major E. S. May, R.A., bound, price 2s. 6d.

"The Value of Mobility for Field Artillery," by Major E. S. May, R.A., paper covers, price 3d.

"The Young Officer's 'Don't,' or Hints to Youngsters on Joining," by an Officer R.A., price 7d.

Examination questions in (*c*), (*d*), (*e*) and (*g*) set in the five examinations ending November 1897 :—

Captains (*c*), (*d*) and (*g*) ... price 1s. 1d.
Lieutenants (*c*), (*d*), (*e*) and (*g*) price 1s. 1d.

Tables of Four-Figure Logarithms, pocket edition, mounted on linen, price 3d.

"Notes on the early history of the Royal Regiment of Artillery," by the late Colonel Cleaveland, R.A., price 2s.

CRETE.

NEWS of our doings during our stay in that distressful country may interest those readers who would like to have gone there at the commencement of 1897, but whose enthusiasm possibly died away as the months went on.

No. 4 Mountain Battery was first warned for embarkation on April 1st., a date which gave rise to grave doubts as to the genuineness of the telegram. However, further comfirmatory details soon followed which resulted in our arrival at Candia on the 26th of the same month.

We found on disembarkation that, owing to the scarcity of eligible building sites, our camp had been pitched for us along the western ramparts of a very unsavoury town, overlooking a drop of about 60 feet into a ditch 50 yards wide, between the Seaforth Highlanders and the Royal Welsh Fusiliers, the whole position affording excellent facilities to any body comtemplating suicide from the back door of his tent. These fortifications were built by the Venetians over 200 years ago and would take a deal of getting into even now.

We beguiled away the spare time of what would otherwise have been a tedious seven months with Athletic Sports, Cricket, Football, Polo, Hockey, and Pony races, the last mentioned being contested over a sporting steeplechase course much to the admiration of the gentle Moslems residing in those parts.

The concert of Europe was very much in evidence on Jubilee Day, all the flag ships of the Great Powers in Cretan waters, with several of their other vessels assembled at Candia to do honour to the British flag, and the morning was devoted to reviewing troops, saluting and lunching, and the afternoon to International Sports and the airing of some very imperfect French.

The foreign navies were all represented on shore as guests of the British troops.

In the Garrison Tug-of-War on that day the Battery got 2nd prize, beating the Fusiliers and H.M.S. "Forte," but succumbing in the final to a team from H.M.S. "Trafalgar" whose tonnage and breadth of beam was immense.

We were, however, more fortunate at the Garrison Sports held on the 10th September, beating two teams from H.M.S. "Empress of India" and one of the Fusiliers' and winning Colonel Sir H. Chermside's Tug-of-War prize. A gunner also defeated all comers at throwing the cricket ball.

On the 30th September the Battery beat the Seaforths and the Fusiliers in a boat race instituted by the "Empress of India" who kindly supplied boats for the crews.

The Cricket season began on the 22nd May and lasted till the 23rd October, during which time the Battery C.C. played 30 matches, winning 20 and losing 10. Each unit had constructed a cricket pitch of its own, of puddled clay under matting, in the ditch of the fortification.

The following are the scores of a few of our victories—our defeats would not, I am sure, prove interesting to readers :—

27th May	4 M.B.	*v.* R.W.F.	4 M.B. 148 (Trumpeter Russell 44, Lt. Fowler 42), R.W.F. 63 and 54.
3rd June	,,	*v.* "Trafalgar"	4 M.B. 106, "Trafalgar" 37.
12th ,,	,,	*v.* "Trafalgar" & "Forte"	4 M.B. 176 (Fowler 44, Russell 34), "Trafalgar" and "Forte" 38.
19th ,,	,,	*v.* R.W.F.	R.W.F. 107, 4 M.B. 150 for 6 wickets (Lt. Hood 39, Capt. Smeaton 38, not out.)
3rd July	,,	*v.* "Cambrian"	4 M.B. 98 (Hood 42), 'Cambrian' 73.
15th ,,	,,	*v.* "Trafalgar"	4 M.B. 139 (Hood 53, Smeaton 32), "Trafalgar" 104.
22nd ,,	,,	*v.* "Cambrian"	4 M.B. 150 (Fowler 52), 'Cambrian' 41.
13th Aug.	,,	*v.* "Royal Oak"	4 M.B. 194 (Lt. Freeland 42), "Royal Oak" 22.
24th ,,	,,	*v.* "Scylla"	"Scylla" 56, 4 M.B. 117.
16th Sept.	,,	*v.* "Empress of India"	4 M.B. 208 (Fowler 104 not out), "Empress of India" 39.

Gunner Bailey bowled extremely well throughout the season.

The head-quarters of the battery left Crete for Malta on the 22nd of November, in the "Jelunga," but as the ship drew the line at carrying mules, an officer and 48 men were left behind with them till a meaner class of transport could be found. This arrived a month later in the shape of the "Joseph Scicluna" and we were all together again at Pembroke Camp on Christmas Day.

The detachment left behind in Crete on two occasions, furnished a mounted escort for Colonel Sir H. Chermside to a village called Arhanes, about 8 miles from Candia, in the Insurgents' country, where he wished to inspect and arrange for the repairing of breaches in the stone aqueduct which carries the water supply to Candia. This aqueduct was engineered and built by the Venetians and is an admirable piece of work; in one place it goes right through a hill for over a quarter of a mile at an average depth of 50 feet.

Each expedition met with a warm reception by the inhabitants but the second was of a more friendly nature than the first.

The first day they went out, the Insurgents and Moslems had had a slight difference of opinion as to the ownership of some sheep feeding on the neutral territory during the night and had been firing at one another all the morning, so when Colonel Chermside and his party appeared, in spite of their exhibiting a Union Jack of gigantic proportions, the Insurgents, possibly suffering from color-blindness and exasperation and acting with strict impartiality, promptly fired upon them, and it was not till the party had advanced to within 600 yards of their assailants that the mistake was discovered. When they came up to the Insurgents they found one of them with 8 woodcock which he had shot in a couple of hours on the spot with a fearsome looking single-barrel muzzle-loading gun of great age, which he was carrying with hammer full cock and muzzle pointing at the person he was favouring with his conversation, and the Colonel being an ardent sportman and not having had a day after woodcock up to that time, seemed more disgusted at this than at the firing.

On the second occasion the party was received with open arms—also with "presented arms"—at the village. The inhabitants took our men in charge and plied them with all the luxuries they could produce although they were at that time rather hard up for provisions, and by their hospitality tried to make up for any little inconvenience they may have caused on the previons occasion.

Taking the Cretans as a whole they are a strange mixture of frankness and cunning, of hospitality and cupidity, of bravery and cowardice and though one may sympathize with them in their present misfortunes, one cannot help being reminded of the criticism of their own poets which St. Paul quotes, and confessing that it is not unjust.

R.A. Charities.

THE Hon. Sec. R.A.C. is anxious to point out the following errors and explanations in the R.A. Charities Report issued with the last month's "Proceedings," as he thinks several officers who examine the accounts will be interested to have this explanation—

Page 6.—For March 1895 and August 1896, *read* March 1875 and August 1876.

Page 24.—Donations £84 17*s*. 3*d*. and Jubilee Steamer £57 17*s*. 0*d*. together make up the total amount of donations shown at page 43.

The apparent discrepancy between the amount of subscriptions shown on page 24, viz., £914 1*s*. 10*d*. and that shown as the total of subscriptions received, page 41, viz., £908 12*s*. 0*d*. is accounted for as follows :—

£	s.	d.	
914	1	10	Subscriptions received *during* 1897.
15	12	0	Refund subscriptions ,, ,, Page 25.
898	9	10	Nett ,, received *during* 1897.
10	3	0	Subscriptions received in 1896 on account of 1897.
908	12	10	Amount acknowledged on account of 1897.

Members receiving copies of the R.A. Charities Report for 1897 are requested to insert the correction slips (which will be found with this month's Proceedings), at page 16 of the report referred to under heading

"Soldiers and Sailors Families Association."

List of additions to the Library during the month of February, 1898.

PRESENTED.	BY WHOM.
Annual Report of the School of Gunnery, 1897. Part I, (Coast), Part II, (Siege). Musketry Regulations, 1898. Approved Arrangements for Siege Practice at Lydd, 1898.	Secretary of State.
Report of the tests of metals and other materials for industrial purposes, 1896.	Chief of the Ordnance, U.S.A.
Journal of the Iron and Steel Institute, No. II, 1897.	The Council.
Army Reform: A question for the people; by Lt.-Col. H. W. L. Hime, late R.A.	The Author.
Preparatory Battle Formations; by Maj.-General H. Bengough, C.B.	The Author.
Map of the World's Telegraphic System..........	Charles Bright, Esq.
Eine Militarische Denkschrift.—Frankfort, 1860.	M. Justen.
Treatise on Military Finance, containing the Pay and Allowances of the British Army; by Tho's Reide. London: 1805.	Lieut. W. Robson, R.A.
Ten Photographs of Flying Bullets..............	C. V. Boys, Esq., F.R.S.

DEPOSITED.	BY WHOM.
Head, Horns and Skulls of various animals; mounted and unmounted.	Major F. A. Curteis, R.A.

PURCHASED.

Kriegsgeschichtliche Beispiele aus dem Deutsch-Franzosischen Kriege von 1870-71. Part VII.
Life of General Sir E. B. Hamley, K.C.B., K.C.M.G.; by A. J. Shand. 2 Vols.
Biologia Centrali-Americana—Zoology, Part 140.
Le Musée D'Artillerie; par Le Colonel Bernadac.
Etude du Règlement de Manœuvre; par H. Bérubé.
All the World's Fighting Ships, (illustrated); by F. T. Jane.
Armement Portatif des Armées Européennes; par le Comm'dt Bornecque.

Duncan Gold Medal Prize Essay, 1898.

THE Secretary has received Essays bearing the following mottos:—

"Festina lente."
"Prove all things."
"The gun of the future . . . . . present gun."

'Enquirer's' letter will be considered by the Committee R.A.I. at their meeting early in March and their decision will be placed on the Notice Board, R.A.I. directly after the meeting.

Obituary.

MAJOR-GENERAL Hon. G. T. DEVEREUX, (retired), died at Heathfield House near Oxford, on 14th February, 1898. He was first commissioned as 2nd Lieut., 18th June, 1836; became Lieut., 13th November, 1838; 2nd Captain, 13th April, 1846; Captain, 23rd February, 1852; Brevet-Major, 28th May, 1853; Lieut.-Colonel, 23rd February, 1857; Brevet-Colonel, 10th November, 1861; Regimental-Colonel, 6th December, 1866. and retired on full pay with the hon. rank of Major-General, 30th September, 1868.

Major-General Devereux served during the Kaffir war of 1852 and was present at the action of Berea (despatches, brevet of major, medal).

CAPTAIN T. M. DICKINSON, whose death occurred suddenly at Balham, on 2nd February, 1898, was first commissioned as Lieut., 5th July, 1884 and became Captain, 9th December, 1893.

LIEUTENANT H. D. HAMMOND, died at Nowshera on 8th February, 1898, from a wound received in action on N.W. Frontier, whilst acting as orderly officer to G.O.C. Peshawar Column, Tirah Expeditionary Force. He was first commissioned as 2nd Lieut., 4th November, 1891, became Lieut., 4th November, 1894.

LIEUT.-COLONEL J. F. HARMAN, (retired) who died at Tunbridge Wells on 9th February, 1898, joined the regiment as Lieut., 17th July, 1866; became Captain, 25th May, 1878; Major, 20th August, 1884; Lieut.-Colonel on half pay, 1st April, 1891; Regimental Lieut.-Colonel, 1st January, 1894, and retired on retired pay, 1st August, 1896. At the time of his death, Lieut.-Colonel Harman was Inspector of Warlike Stores and Military Adviser to the Australian Colonies, which appointment he held since 1st May, 1892.

COLONEL L. W. TAYLOR, (retired), died at Hamburg, 28th January, 1898. He joined the Bengal Artillery as 2nd Lieutenant, 12th June, 1858; became Lieut., 27th August, 1858; Captain, 1st August, 1872; Major, 11th May, 1879; Lieut.-Colonel, 12th April, 1888; Colonel, 29th September, 1893, and retired on Indian pension and extra annuity, 19th September, 1894.

4

NOTES

FROM

CORRESPONDING MEMBERS.

THE following works are now on sale at the R.A. Institution and will be forwarded post free at the prices noted after their titles below:—

"Twenty-four hours of Moltke's Strategy" by Fritz Hoenig. Translated by Colonel N. L. Walford, price 5s.

"The Shrapnel Fire of the Field Artillery" by Major-General Rohne. Translated by Colonel N. L. Walford, price 2s. 6d.

Major-General Stubbs's "List of Officers of the Bengal Artillery," price 5s. 3d.

"Field Artillery Fire," by Captain W. L. White, R.A., price 1s. 2d.

"Ranging Note-Book," by Captain S. W. Lane, R.A., price 1s. 1d.

"Achievements of Field Artillery," by Major E. S. May, R.A., bound, price 2s. 6d.

"The Value of Mobility for Field Artillery," by Major E. S. May, R.A., paper covers, price 3d.

"The Young Officer's 'Don't,' or Hints to Youngsters on Joining," by an Officer R.A., price 7d.

Examination questions in (*c*), (*d*), (*e*) and (*g*) set in the five examinations ending November 1897:—

Captains (*c*), (*d*) and (*g*) ... price 1s. 1d.
Lieutenants (*c*), (*d*), (*e*) and (*g*) price 1s. 1d.

Tables of Four-Figure Logarithms, pocket edition, mounted on linen, price 3d.

"Notes on the early history of the Royal Regiment of Artillery," by the late Colonel Cleaveland, R.A., price 2s.

Duncan Gold Medal Prize Essay, 1898.

THE Secretary has received, in addition to those published in March, "Proceedings" Essays bearing the following mottos:—

"Labor omnia vincit."
"Circumspice."
"Tempora mutantur."
"Ex malis eligere minima."
"Cascable."
"Etre à la fois. . . . . moderne."
"Nec cupias nec metuas."
"Unhasting yet unresting work" (1 copy only)
"Leo."

THE Committee R.A.I. have received a letter from an officer asking if they would receive certain articles of Regimental interest that he would like to leave to their care, but was not sure if they would be welcome coming from one not a member of the R.A.I. They wish it to be made known as widely as possible that the Institution is always available for the reception and careful display of any object of Regimental interest and they hope that members will call the attention of anyone possessing such objects to this fact.

Messrs Eyre & Spottiswoode will shortly publish by subscription, "The History of Landguard Fort, in Suffolk," by Major J. H. Leslie late Royal Artillery. This Fort has played so great a part in the Military History of England that its History should be particularly interesting to Military men, and especially to officers of the Regiment many of whom must have served there.

IT is notified for the information of those who subscribed to a memorial to be erected in memory of the late Captain A. M. Cecil Dale, Royal Artillery, that a granite Cross has been placed over his grave in the Charlton Cemetery.

List of additions to the Library during the month of March, 1898.

PRESENTED.	BY WHOM.
Regulations for the equipment of the Regular Army, 1898	Secretary of State.
Rifle and Carbine Exercises, &c., 1898 ...	
Arrangements for supply of Ammunition, Targets, and other stores, for the practice of Royal Horse, Field, and Mountain Artillery in Great Britain, for the year 1898	
The Turkish Army; its characteristics and capabilities	Secretary of State.
Professional papers of the Corps of Royal Engineers. Vol. XXIII, 1897	R.E. Institute.
Special Reports on Explosions; Nos. 126 and 127	H.M. Inspector of Explosives.
Examination Papers, R.M. Academy, Woolwich, 1897	The Governor.
Twelve Indian Statesmen, by George Smith, C.I.E., LL.D.	The Assistant Commandant, R.M. Academy.
Six maps of the Waterloo Campaign	Vet.-Major J. C. Dwyer, A.V.D.
Lecture, "The Artillery of the Ancients," illustrated by photographic prints	Captain R. Saunders, R.A.
The India List, and India Office List, 1898	Secretary of State for India.
Report on the result of the Examination held in November 1897, of officers of Regular Forces, Militia, Yeomanry, and Volunteers in subjects *c*, *d*, *e*, *f* and *g*. ...	D.G. of Military Education.
Map of Upper Egypt and the Sudan. I.D. W.O., No. 1281, 11 Sheets	D.G. of Military Intelligence.

PURCHASED.

The Royal Navy: A history from the earliest times to the present; by William Laird Clowes. Vol. II. London, 1898.

Drake and the Tudor Navy, with a history of the rise of England as a maritime power; by Julian S. Corbett. 2 Vols. London, 1898.

Monograph of the Turdidae, or family of Thrushes. Part I.

The private journal of the Marquess of Hastings, K.G.; edited by his daughter the Marchioness of Bute. 1858.

THE
ROYAL ARTILLERY ANNUAL DINNER

WILL TAKE PLACE AT

EIGHT O'CLOCK,

On FRIDAY, 3rd JUNE, 1898,

AT

THE HOTEL MÉTROPOLE

(Private Entrance in Whitehall Place),

HIS ROYAL HIGHNESS THE COLONEL OF THE REGIMENT

IN THE CHAIR.

Prices as follows :—

	£	s.	d.
Subscribers	0	12	0
Non-Subscribers	1	12	0

Dinner Tickets will not be supplied, but officers are requested to give their visiting cards at the entrance, on the evening of the dinner, to the official appointed to receive them.

It is particularly requested that officers intending to dine will furnish *early* intimation to the Honorary Secretary ; and, to avoid inconvenience, it is desirable that the same should be accompanied by *cheque*, for the amount of subscription to the dinner, *except from officers who bank with Messrs. Cox & Co.*, who are informed that the amount due from them for the dinner will be charged to their accounts.

Names of officers who notify their intention of being present at the dinner cannot be removed from the list after the 31st May, and officers who omit to notify before that date will be charged an extra sum of 5s.

Advertisements will duly appear in the *Morning Post.*

All communications to be addressed to

MAJOR F. G. STONE,
Hon. Secretary R.A. Dinner Club,
HORSE GUARDS,
WAR OFFICE, PALL MALL.

Should any officer wishing to dine have been unable to give notice before 31st May, he should inform the Secretary at the War Office direct, and not apply to the Hotel Officials.

RULES.

No suggestion has been received for any change in the Rules, which are as follows :—

(1.) All officers serving, or who have served, in the Royal Artillery are eligible to attend, the annual general Regimental Dinner.

(2.) Officers actually serving, are eligible to become members of the Royal Artillery Dinner Club at an annual subscription of 5s., and an entrance fee of—

(*a*)	For 2nd Lieutenants	nil.
(*b*)	„ „	5s. for every year of service up to three years
(*c*)	„ Captains	£1 0s. 0d.
(*d*)	„ Majors	£1 5s. 0d.
(*e*)	„ Lieut.-Colonels...	£1 10s. 0d.

The entrance fee and first annual subscription are payable on joining, and should accompany the notification to the hon. secretary that the officer wishes to become a member of the Dinner Club.

Subsequent annual subscriptions should be paid into Messrs. Cox & Co., Charing Cross, on the 1st of January, to the credit of the Royal Artillery Dinner Club.

(3.) Until further notice the price of the dinner will be:—

	£	s.	d.
For subscribers (members of Dinner Club)	0	12	0
„ non-subscribers	1	12	0

Payment for the dinner should be made to the hon. secretary at the time intention to dine is notified, or in any case not later than three days before the dinner. Officers who bank with Messrs. Cox & Co. are informed that the price of the dinner will be charged in their accounts.

(4.) Notification of intention to dine should be made to the hon. secretary as early in June as possible, if notification is not *received* two clear days before the date of the dinner an extra payment of 5s. will be required. Withdrawal of names of officers unavoidably prevented from dining should be effected two clear days before the date of the dinner, as after that time no money can be returned.

(5.) (*a*) It is particularly requested that officers will inform the hon. secretary as early as possible, if they wish seats reserved for themselves and their friends, and the position they would prefer. *It should be noted that the arrangement for seats beforehand is far the best plan, both in the interests of the officers dining, and of the secretary, as it enables the latter to meet the wishes of officers in a manner which would be impossible if the allotment of seats be left to haphazard arrangements at the last.*

(*b*) Generally speaking, applications for seats will be dealt with in the order in which they are received: all applications must be received two clear days before the dinner.

(*c*) When any number of officers wish to sit together, applications must be received from each member of the party; otherwise confusion is apt to occur, owing to the same officer being possibly included in two parties without his knowing it.

(*d*) General officers and colonels-commandant will be placed in order of regimental seniority, alternately to the right and left of H.R.H. the Colonel of the Regiment, unless they arrange otherwise with the hon. secretary.

(*e*) A plan of the table can be seen at the War Office until two days before the dinner: the day immediately preceding the dinner will be occupied in filling in the names of officers opposite the seats allotted to them, and in preparing two copies of the plan so completed, one for the dining-room and one for the ante-room, to be placed in the Whitehall Rooms by 2 p.m. on the day of the dinner.

(*f*) Officers are particularly requested not to change their seats, after the official cards have been put in the allotted places at the table, without communicating personally with the hon. secretary or his clerk. Much difficulty has been caused by officers leaving the official cards in the allotted places and, at the same time putting their own visiting cards in other places; the result being that it has appeared as if an insufficient number of seats were provided.

(*g*) Officers who have not previously arranged with the hon. secretary for seats, can secure any vacant seats by placing their visiting cards in the required places on the table after 3 p.m.; but it is essential that no cards be put upon the table, unless the officers whose names are on the cards, are certain to occupy the seats, otherwise the same difficulty will be experienced as in (*f*) above.

(6.) No dinner tickets are required, but it is particularly requested that every officer will give his visiting card to the clerk at the entrance to the Whitehall Rooms, in order that a correct tally of the officers who dine may be kept. The omission to comply with this formality leads to a discrepancy between the numbers as counted at dinner by the hotel officials, and the numbers furnished by the hon. secretary to the management. Officers who enter from the hotel entrance in Northumberland Avenue, instead of by the Whitehall rooms, entrance in Whitehall place are most liable to omit giving their cards or names at the door.

(7.) The band will not play during dinner, but will withdraw after playing "The Roast Beef of Old England," and come in again in time to play "God Save the Queen" after the first toast; selections will subsequently be performed between the toasts and speeches.

(8.) The accounts can be inspected at the War Office by any officer of the Regiment, and any suggestion which may be received in connection with the general management of the dinner and the dinner funds, will be brought forward by the hon. secretary for discussion at the annual meeting which is held at the Royal United Service Institution, at 3 p.m. on the day of the dinner.

F. G. Stone, Major, R.A.
Hon. Secretary R.A. Dinner Club.

Obituary.

MAJOR-GENERAL SIR G. BOURCHIER, K.C.B. (retired), died at Twickenham, 15th March, 1898. He joined the Bengal Artillery as 2nd Lieutenant, 11th December, 1838; became Lieutenant, 17th August, 1841; Captain, 3rd March, 1853; Major, 19th January, 1858; Brevet-Lieutenant-Colonel, 24th March, 1858; Colonel, 25th April, 1864, and retired on full pay with the hon. rank of Major-General, 1st August, 1872. Sir George Bourchier served in the Gwalior Campaign, 1843-44, including the battle of Punniar (bronze star). Indian Mutiny, and was present at the actions of Trimmoo Ghat, siege, assault and capture of Delhi (despatches, brevet of major), Bolundshuhur, Alighur, Agra, relief of Lucknow by Lord Clyde, and defeat of the Gwalior Contingent at Cawnpore (repeatedly mentioned in despatches; brevet of Lieutenant-Colonel; C.B.; medal with two clasps.)

COLONEL H. C. S. DYER (retired), who died suddenly at Manchester, 20th March, 1898, was first commissioned as 2nd Lieutenant, 22nd December, 1852; became Lieutenant 17th February, 1854; 2nd Captain, 14th November, 1859; Captain, 22nd August, 1868; Brevet-Major, 15th April, 1864; Lieutenant-Colonel, 1st April, 1874, and retired with the hon. rank of Colonel, 1st January, 1876. Colonel Dyer served during the Crimean War, 1855, including the siege and fall of Sebastopol—horse killed. (Medal with clasp and Turkish medal.) Indian Mutiny, 1857-8; was present at the relief of Lucknow by Lord Clyde; battle of Cawnpore (horse killed); action of Kalee Nuddee; affair of Ramgunga; siege and capture of Lucknow; actions of Bareilly and Shahjehanpore; capture of the forts of Bunai and Mohumdee. (Despatches, medal with two clasps and brevet of major.)

MAJOR-GENERAL H. HAMMOND (retired), whose death occurred at Mentone, 23rd February, 1898, joined the Bengal Artillery as 2nd Lieutenant, 11th June, 1838; became Lieutenant, 17th August, 1841; Captain, 3rd March, 1853; Major, 24th March, 1858; Brevet-Lieutenant-Colonel, 26th April, 1859; Colonel, 30th December, 1864, and retired on full pay with the hon. rank of Major-General, 1st August, 1872. General Hammond served in the expeditions against the Wuzeeree and Sheranee frontier tribes near Bunnoo in 1851-2; Indian Mutiny, including the relief of Lucknow by Lord Clyde; attack on the Secunderabagh (severely wounded; mentioned in despatches); action of Kalee Nuddee, entry into Futteghur, action of Kirkrowlie (conduct mentioned as "noble"), commanded foot artillery at the taking of Bareilly and at advance on Mahomdee (Brevets of Major and Lieut.-Colonel; medal with clasp).

COLONEL J. A. R. MEAD (retired), whose death was announced as having occurred at Redhill, 1st March, 1898, entered the Bengal Artillery as 2nd Lieutenant, 9th December, 1844; became Lieutenant, 1st January, 1848; 2nd Captain, 27th August, 1858; Captain, 21st April, 1860; Major, 5th July, 1872; Lieutenant-Colonel, 1st August, 1872, and retired on full pay with hon. rank of Colonel, 14th June, 1876.

2ND LIEUTENANT F. T. ORD died at Pembroke Dock, 25th February 1898. He was commissioned from the Militia Artillery 18th June 1897.

MAJOR G. P. SALMON (retired), who died at Perth, 2nd March, 1898, was first commissioned in the Bengal Artillery as 2nd Lieutenant, 11th December, 1829; became Lieutenant, 22nd August, 1838; Brevet-Captain, 11th December, 1844, and retired with hon. rank of Major, 6th March, 1853.

DIARY OF FIXTURES.

APRIL.

Day of the		Regimental.	Cricket, &c.	Private.
Mth.	Wk.			
1	F	... ...	R.A. *v.* R.E. Rackets and Billiards at Chatham.	... ...
2	S	... ...	do.	... ...
3	**S**	... ...	... ...	... ...
4	M	... ...	... ...	... ...
5	T	... ...	... ...	... ...
6	W	... ...	... ...	... ...
7	Th	... ...	... ...	... ...
8	F	Good Friday.	... ...	... ...
9	S	... ...	... ...	... ...
10	**S**	Easter Day.	... ...	... ...
11	M	Bank Holiday.	... ...	... ...
12	T	... ...	... ...	... ...
13	W	... ...	... ...	... ...
14	Th	... ...	... ...	... ...
15	F	... ...	... ...	... ...
16	S	... ...	R.A Races at Aldershot	... ...
17	**S**	... ...	... ...	... ...
18	M	... ...	... ...	... ...
19	T	... ...	... ...	... ...
20	W	... ...	... ...	... ...
21	Th	... ...	... ...	... ...
22	F	Band Concert Queen's Hall at 3 p.m.	... ...	... ...
23	S	... ...	... ...	... ...
24	**S**	... ...	... ...	... ...
25	M	... ...	... ...	
26	T	... ...	R.A. *v.* R.E. Golf matches at Sandwich. Newmarket 1st Spring Meeting begins.	... ...
27	W	... ...	... ...	... ...
28	Th	... ...	... ...	... ...
29	F	1 Dn. (F.A. 1st Bde. Dn. Aldershot) arr. Okeh'mpton.	... ...	... ...
30	S	1 Dn. (R.H.A. Woolwich) arrives at Shoeburyness.	... ...	

MAY.

Day of the		Regimental.	Cricket, &c.	Private.
Mth.	Wk.			
1	**S**	... ...	... ...	... ...
2	M	... ...	... ...	... ...
3	T	... ...	... ...	... ...
4	W	... ...	... ...	... ...
5	Th	... ...	... ...	... ...
6	F	... ...	Kempton Park "Jubilee" Meeting.	... ...
7	S	2nd Dn, (R.H.A. Aldershot) arrives at Shoeburyness.	do do	... ...
8	**S**	... ...	... ...	... ...
9	M	... ...	... ...	... ...
10	T	... ...	Newmarket 2nd Spring Meeting.	... ...
11	W	... ...	... ...	... ...
12	Th	... ...	... ...	... ...
13	F	... ...	... ...	... ...
14	S	3rd Dn. (F.A. Newcastle) arrives at Shoeburyness.		

MAY.

Date of the Mth.	Wk.	Regimental.	Cricket, &c.	Private.
15	**S**	... ...	... ...	... ...
16	M	... ...	... ...	... ...
17	T	... ...	... ...	... ...
18	W	.. ...	... ...	... ...
19	Th	... ...	... ...	... ...
20	F	... ...	... ...	... ...
21	S	4th Dn. (F.A. 2nd Bde. Dn. Woolwich) arrives at Shoeburyness.	... ...	... ...
22	**S**	... ...	...	... ...
23	M	... ...	... ...	... ...
24	T	... ...	Epsom Races begin.	... ...
25	W	... ...	DERBY. R.A. *v.* Aldershot at Aldershot.	... ...
26	Th	2nd Dn. (F.A. 2nd Bde. Dn. Aldershot) arrives at Okehampton.	do do	... ..
27	F	... ...	OAKS.	... ...
28	S	5th Dn. (F.A. 3rd Bde. Dn. Woolwich) arrives at Shoeburyness.	... ...	... ...
29	**S**	Whit Sunday	... ...	... ...
30	M	Bank Holiday	... ...	... ...
31	T	... ...	... ...	... ...

JUNE.

Date of the Mth.	Wk.	Regimental.	Cricket, &c.	Private.
1	W	... ...	... ...	... ...
2	Th	... ...	... ...	... ...
3	F	Annual General Meeting R.A.I. at R.U.S.I. Whitehall 3 p.m.	REGIMENTAL DINNER R.A. *v.* Eton Ramblers at Woolwich.	
4	S	6th Dn. (F.A. 1st Bde. Dn. Woolwich) arr. Shoeb'yness	do do	... ...
5	**S**	... ...	... ...	... ...
6	M	... ...	... ...	... ...
7	T	... ...	... ...	... ...
8	W	... ...	... ...	... ...
9	Th	... ...	... ...	... ...
10	F	... ...	R.A. *v.* Butterflies at W'lwich	... ...
11	S	7th Dn. (F.A. Colchester) arrives at Shoeburyness.	do do	... ...
12	**S**	... ...	... ...	... ...
13	M	... ...	... ...	... ...
14	T	... ...	Ascot begins	... ...
15	W	... ...	... ...	... ...
16	Th	... ...	... ...	... ...
17	F	... ...	R.A. *v.* R.E. at Chatham.	... ...
18	S	3rd Dn. (R.H.A. mixed) arrives at Okehampton. 8th Dn. (F.A. Weedon) arrives at Shoeburyness.	do do	... ...
19	**S**	... ...		
20	M	... ...	R.A. *v.* M.C.C. at Lord's.	... ...
21	T	... ...	do do	... ...
22	W	... ...	R.A. *v.* Yorkshire Gentlemen at Woolwich.	... ...
23	Th	... ...	do do	... ...
24	F	... ...	... ...	... ...
25	S	... ...	... ...	... ...
26	**S**	... ...	... ...	... ...
27	M	... ...	... ...	... ...
28	T	... ...	Newmarket 1st July Meeting begins.	... ...
29	W	... ...	... ...	... ...
30	Th	... ...	Oxford *v.* Cambridge begins	... ...

5

PRÉCIS
AND
TRANSLATION.

REVUE D' ARTILLERIE.

THE ORIGINS OF THE JAPANESE ARMY.

(Lecture given by Colonel Lebon, Commanding the 1st Regiment of Artillery, to the Officers of Bourges garrison.)

BY

F.E.B.L.

It is an interesting subject to investigate by what chain of circumstances feudal troops, obeying princes often enemies one of the other, still armed only 25 years ago for the most part with swords, bows and lances—how such troops have been transformed into a homogeneous highly disciplined army with a European organisation, and animated by a military spirit of the loftiest nature.

As was seen in the war with China this army has given proof of great method in the preparation of its plans and of extraordinary energy in their execution ; that too amid the difficulties inherent to operations conducted simultaneously on land and sea, in regions like Corea and Manchuria where roads can hardly be said to exist, in a severe climate where the Centigrade thermometer sometimes fell to 40° below zero[1].

The composition of the Japanese Army when war broke out was :—

7 Infantry divisions (1 guard, 6 line).
7 Regiments of field artillery (40 batteries) (1 guard, 6 line).
7 Cavalry groups (21 squadrons) (1 guard, 6 line).
7 Engineer battalions (20 companies).
7 Train battalions (14 companies).
4 Regiments Fortress Artillery (48 batteries).
Total effective: about 120,000 men.

This is the active army, completely constructed and organized. It does not include the reserves and the territorial army which are still incomplete in their organization. According to recent information the Japanese government have decided to devote to the increase of their land and sea forces no less than 40 millions sterling derived from the indemnity to be paid by China. This sum will be spread over a period of 20 years and will be in addition to the ordinary budget. More than half of it will go to the navy ; and the number of army divisions has already been raised from 7 to 12.

But numbers by themselves are of no great importance when Asiatics are in question. What we specially want to know is the spirit which animates the

---

[1] When an army corps had to operate in Manchuria in the depth of winter, Marshal Yamagata engaged coolies to carry fur cloaks for his men, which they found on arrival at their bivouac.

Japanese army. To arrive at that we must go back to its origin and see what it was in the feudal time. Now military organization is so bound up with political and social organization that it is difficult to speak of one without the other. Japan is a striking example of that solidarity. Its political organization underwent a complete revolution between 1868 and 1873, and the miitary followed suit. From a feudal state the Empire passed in five years to an absolute monarchy, that is to say, in that short period it effected an evolution comparable to that of France in two centuries from Louis XI to Richelieu.

Let us then see what was the feudality which foundered in the revolution of 1868 : it will be apparent that it was essentially military. We will examine the causes which led to its suppression and finally note how the central authority succeeded in making a national army out of feudal bands animated by the spirit of clanship.

THE FEUDALITY.

THE SHOGUNS.—The Empire was divided between 300 to 400 Princes or Daimios, among whom the Taicoon had a special position not easily understood by Europeans.

The Taicoon was originally a sort of lieut.-general of the Emperor or Mikado, his true name was Shogun. The name of Taicoon, which several Shoguns took, implies an idea of sovereignty and was therefore a usurpation.

The Shogun, of whom several were men of high standing and of great energy, had little by little extended their power to such a point that the Mikado, who had not ceased to be the true sovereign, seemed to have renounced for ever all interference in government. A recluse in his court of Kioto known also as Miaco, he was considered by foreigners as a fetish invisible to mortal eye and deprived of all real power. The diplomacy of Europe and America fell into the same mistake, and the first treaties signed between 1854 and 1866 were effected with the Taicoon as the sole temporal sovereign. However it was found on the day the Mikado wished to ostensibly resume the reins of government that his power was immense and uncontested. The Taicoon, summoned by the "Son of Heaven" in February, 1868, to surrender the power which he had usurped, abdicated almost immediately after a feeble resistance. His young brother, who was his presumptive heir, was received at the Tuileries in 1867 with Royal honours. Six years later he was a pupil-sub.-lieutenant at the military school of Yedo, and he came one day in the ranks with his comrades to visit the arsenal which a French mission had established in the palace of his ancestors, the Mito family, which had been confiscated and of which the garden and park covered about 150 acres in the middle of Yedo (Tokio).

In fact the Mikado[1] had been always regarded by every Japanese as the supreme master of the empire. Chief of the Shinto religion, regarded by its votaries as a descendant of the gods, the Mikado has in reality been for 2,500 years the sole proprietor of the soil; and in the history of European kings no analogy could be found to explain the immense authority of his name. Also in the event of rebellions and civil wars in Japan it is never the Mikado's authority which is at stake, but that of the party in power, whom the rebels accuse of deceiving the Emperor.

During the feudal time it was as in Europe. Every prince maintained his men at arms with his own resources; consequently their number was proportional to the wealth and importance of their master. They numbered altogether about 400,000.

---

[1] The present Mikado, Mutsu Hito, was born in 1852, and succeeded to the throne 13th February, 1867.

This number, besides fighting men, included functionaries and employées of every sort, from the highest to the lowest.

Their caste enjoyed a very high prestige and excelled all other classes, such as farmers and especially merchants and shopkeepers, who were almost on the last rung of the social ladder. On the eve of the revolution, even in 1867, the greatest banker of Tokio, the Rothschild of Japan, prostrated himself with his forehead to the ground before handing his pay to a Samourai with the rank of sublieutenant.

Legend of the Forty-seven Samourais.

This caste was devoted to their princes even to death. The sentiment of honour with them was carried to the highest pitch, and what will give an idea of it is the legend, indeed quite authentic, of the forty-seven Samourais who stabbed themselves to death under the following circumstances:—

Their prince had suffered an insult; they resolved to avenge him. But to succeed more surely and to await a favourable occasion they had to feign forgetfulness of their vengeance. Thus one day a Samourai of another clan accused them of cowardice; they submitted in silence to this fresh insult. Shortly afterwards the favourable opportunity occurred and they killed their prince's enemy. This vengeance accomplished—and to conform to the laws of Japanese honour and to expiate their crime—they all went away together and each killed himself by his own hand. The Samourai who had accused them of cowardice was seized with remorse at having insulted these brave men, and at once decided that honour required his death by his own hand on their tomb.

The tomb of these men at arms was still, 25 years ago, the object of an annual pilgrimage of the Japanese people. And here it should be noted that suicide is rare in Japan when honour is not at stake.

With such a military caste, having a fanatic love of the profession of arms, and filling all posts in the government of each province, one understands readily that the Japanese Empire has been for centuries the theatre of intestine struggles. It was to try and introduce order into this feudal anarchy that the functions of Shogun were created in the century previous to the Christian era. The acts of courage and heroism which have distinguished these struggles would fill volumes.

Expedition to Corea in the 16th Century.

Among them may be cited an expedition directed against Corea and China at the time when Henry IV was ascending the throne of France and Elizabeth was Queen of England. Admiral Layrle gives the following account of it:—

In a most troublous time, in 1590, a Shogun formed the idea of closing the era of dissension, and of employing all these soldiers, inured to war by civil strife, in the conquest of Corea and China.

For five years he prepared the means of throwing upon the Asiatic continent a Japanese Armada. He assembled his generals, shewed them on a map the road to Pekin, inflamed their minds with an idea of the wealth which such a campaign would bring them, and he distributed in advance the territories which their courage was to conquer. Enthusiasm was universal among these warlike people, and 300,000 men left the western coast of Japan. Corea was soon three parts conquered and the army was on the Manchurian frontier. Spoils innumerable picked up on the field of battle—notably thousands of human ears which filled the junks—had been sent to the Imperial city, Kioto, when death stopped the career of the victorious Shogun. He dead, civil war soon broke out again in Japan, and the Army in Corea was recalled by the coalised princes of the south who would not recognize the new Shogun.

THE SHOGUN YEYAS.—He advanced at the head of 75,000 men against the southern coalised princes who had 128,000 men.

The two armies had bronze guns and also used arquebuses, but the fight at the range of these did not last long. The true struggle, hand to hand, soon began; after several hours victory seemed still uncertain when there was a defection in the coalised forces. Yeyas then, understanding that the moment had come when he might compensate his numerical inferiority, advanced his reserve drums beating and musical shells resounding, Yeyas himself leading the charge. Nothing could resist him, the armies of the south were broken and the butchery commenced. It was horrible; none of the wounded would consent to fall alive into the enemy's hands, and as in nearly all Japanese battles they died, each by his own hand, and those not strong enough to do it implored passing fugitives to despatch them.

When according to custom the review of his victorious troops commenced, Yeyas who had been fighting all day wearing an *atsimaki*, a sort of handkerchief knotted over the forehead and with a metal plate in front, called for his helmet, and fixing it firmly on his head said: "It is not till after the victory that a general should assume this head-dress."

A monument is still shewn which commemorates this event, in which have been deposited the 40,000 heads which the soldiers triumphantly paraded on the plain.

After his victory and the crushing of the Daimios of the south, Yeyas proved himself to be a legislator and organizer of the highest order. He succeeded in establishing a state of affairs which gave to Japan two and a half centuries of internal calm and tranquillity, from the commencement of the 17th century until the period when the European powers forced an entry into their ports forty years ago. It would take too long to explain by means of what complicated and minute machinery Yeyas and his immediate successors succeeded in holding in check that military feudality which had up to their time been so turbulent. Let however the following measures be cited. He obtained the Emperor's sanction to the position of Shogun being made hereditary in three great families, instead of devolving in principle on the most worthy, that is to say, in fact, to the most active or to the most intriguing. He thus diminished the chances of those fierce competitive struggles which had so often shed the country's blood. All the Daimios were obliged to reside 6 months at Yedo; and during the other 6 months when they returned to their estates they had to leave at Yedo a part of their families, in trust as hostages.[1]

Another equally important measure of Yeyas was the closing of Japan.

Every Japanese was forbidden under pain of death, to travel abroad, and in addition any European who should attempt to land on the coast of Japan was to be condemned to death. He well understood the character of his countrymen who have a passionate love for new ideas, but he did not foresee the advent of steamships which should one day force an entry into his country.

Finally, with the same idea of stifling the germs of independence and of dangerous innovations, the Shoguns massacred the 40,000 Christians, born of the missionary zeal of St. François-Xavier.

A curious circumstance nevertheless is that this terrible persecution did not succeed in destroying the seeds of Christianity in Japan, for in 1874 the Catholic Bishop of Nagasaki declared that he had found in the south of Japan, and particularly in the Island of Firado where St. François-Xavier landed in the 16th century, 10,000 families who had secretly preserved the Christian traditions, although they were not allowed to have any priest regularly appointed, and their worship and dogmas were more or less changed.

---

[1] It is curious to compare this measure with the action of Louis XIV who, haunted by the memory of the troubles of the Fronde, attracted all his nobility to Court, to make them less turbulent and to deprive them of the independence they enjoyed on their estates.

SUPPRESSION OF FEUDALISM.

We have seen what Japanese feudality was and we naturally ask ourselves why the frame of government so suddenly broke down, which the genius of Yeyas had so scientifically constructed, and which had given to his country 250 years of peace.

Many explanations have been given. It has been suggested that the complicated organism created by Yeyas contained within itself the germs of destruction. The real explanation is much more simple, the result was due to a brutal fact: the apparition of foreigners in steamships who could venture without fear into these dangerous seas and touch those inhospitable shores. Europe and America, in their commercial expansion, had an equal desire for Japan as a solid link to join them across the Pacific Ocean, and they were about to exact from Japan the hospitality they required.

In 1853 the American Commodore Perry arrived in Yedo Bay with four ships of war, and demanded, by means of a letter from the President of the United States, a treaty of friendship and commerce.

The following is the melancholy account of this matter given by a native historian :—

"The Japanese law was explained to the American Envoy • • • • but he wouldn't listen to it. • • • The object of his mission was reported at Kioto, and the Imperial Court ordered the priests of the great temple Ise to offer their prayers for the removal of the barbarians. But it was henceforth all up with the inviolability of the soil of the gods, and we should now never cease to see the great black ships furrowing our seas and vomiting their torrents of smoke."

Commodore Perry departed, announcing that he would come back the following year for a reply. All the Daimios took up arms ; forts were built and bells were melted into guns.

However when Perry returned in 1854 they had reflected that resistance was impossible and risked the exasperation of an enemy against whom they could not fight without borrowing from him his weapons. The Taicoon therefore replied to the letter which the President had addressed to the " Emperor of Japan " by a letter which suggested that he was invested with sovereign rights. He subsequently signed analogous treaties with Great Britain, Russia and France, and opened to foreigners five ports of the Empire (1857).

There was the error already alluded to, of believing in the existence of a temporal Emperor in conjunction with the Mikado. However the Mikado did nothing to remove this false impression, and his silence has caused surprise. But for one who knows the Japanese character there appears to be no doubt that the Mikado was not sorry to let the Europeans deal with a " man of straw " who could afterwards be disavowed. The Mikado thus gained the necessary time to look about him and select a line of conduct, without having compromised himself by negotiations with these western barbarians, whose manners and ideas were unknown at the Imperial Court.

DANGERS OF THE FEUDAL ORGANIZATION.

However, certain Japanese, far-seeing statesmen, understood that in presence of all these foreigners who had forced an entry into their country it was indispensable—even at the price of very existence—to substitute for the complicated feudality a central power holding in its hand all the forces of the Empire.

In fact the Daimios soon engaged, each on his own account, in more or less official transactions with the foreigners. The Taicoon obtained from Napoleon III the sending of the first military mission, and the Prince of Satzuma engaged the Comte de Montblanc, who brought over several retired N.C.O's. to instruct the Prince's troops. All the Princes, urged on by foreign merchants, often little scrupulous, began to dissipate their fortunes in the purchase of arms, munitions, steam vessels, and the most preposterous European trinkets. It was the recommencement of anarchy, but still more dangerous than in the sanguinary struggles of former times; for it was being done under the eyes of foreign powers, among whom several had already calculated on gathering up the *spolia opima* of the dismembered Empire of the Rising Sun.

MARSHAL SAIGO.—Among the statesmen who understood the danger the most interesting personage was Marshal Saigo. He was the chief, or *Karo*, of the Prince of Satzuma's soldiers. At the same time he was a sort of prime minister, a real mayor of the palace, who generally exercised power in the name of the Prince. It will be interesting to show what these warrior-statesmen were who accomplished the fall of the Taicoon and the abolition of feudalism. To trace the career of the Marshal it will be necessary to anticipate events.

One day in 1873 Marshal Saigo, who had now become after the revolution commander-in-chief of the new army, was dining at the French Mission at Yedo. He wore the old Japanese costume, differing in that from most of his countrymen, who on the morrow of the revolution adopted a hasty and somewhat puerile imitation of European costumes. His great pagoda sleeves left his arms bare up to the elbow. His right arm had a deep scar shewing that the fore-arm had been ripped up. The explanation of it was as follows:—At the time when Saigo was traversing the southern provinces of Japan to concert with the other *Karos* upon a plan of revolution he was pursued and tracked by the Taicoon's agents and was obliged to take refuge in a monastery of Buddhist bonzes. One night he was discovered and the assassins disguised penetrated his hiding place. These bonzeries, like our monasteries of the middle ages, are generally fortified and surrounded with large moats full of water wherever the ground admits of it. Saigo, pressed by the assassins in the night, had only just time to jump from the rampart to swim across the moat; the two assassins did the same and he fought with them in the water and succeeded in stabbing them both, but his arm was ripped up by a dagger from the elbow to the wrist.

Saigo had the sagacity to foresee—what is now being realised in Corea—that one day the interests of Japan would clash with those of Russia. His end was as dramatic as its commencement. Finding, not without reason, at a given moment, that the revolution was going too far and passing the limits he would have assigned to it, he withdrew from the councils of government and returned to live in his province of Satzuma at the southern extremity of Japan. Convinced, rightly or wrongly,—the point has never been cleared up—that one of the ministers had fomented a plot to assassinate him he placed himself at the head of a number of discontented Samourais, offspring of the revolution, and in 1877 he raised the standard of revolt, not, be it understood, against the Emperor, but against His Majesty's advisers. At the head of 40,000 men badly organized, still armed for the most part with their ancient swords, but who were devoted to him, body and soul, he maintained for eight months an arduous struggle with the government troops which numbered some 70,000 men. He gave proofs of true military genius: resisting step by step, escaping with agility when nearly surrounded, and by rapid marches in an almost impracticable mountainous country falling upon the flanks and rear of the Imperial army. But the fight was too unequal; and Saigo, by a strange reversal of fortune, was destined to be crushed by the national army of which he was the creator.

When 18,000 of his men had fallen, having accounted for at least an equal number of the Imperial troops, Saigo, wounded in the thigh in the last fight, had his head cut off on the field of battle by one of his faithful Samourais. This one and a hundred other of the principal Samourais were unwilling to survive their chief and killed themselves forthwith.

A short time before this event one of his old companions-in-arms, who was also his brother-in-law and commanded the Imperial Fleet, wrote begging him to make his submission, guaranteeing him the Emperor's clemency. Saigo refused, and his reply was in the following noble strain :—

"You say that in the event of our surrender you would ask the Government to extend to us its clemency. That is absurd. We are fighting in the name of justice and in a just cause, we are not concerned in the fate which is in store for us. Your Excellency pretends that we can recover our honour, we no longer understand you. How can we have lost honour, since the cause of justice is honorable."

According to the old traditions of Japanese honour, a defeated soldier like Saigo could not end his days otherwise than by killing himself on his last field of battle, since death had not come to meet him. Saigo is the most popular figure in modern Japan. In the smallest village there is to be found an image of him whom they call the Great Saigo. Six months later his death was revenged by six of his Samourais, who assassinated close to the Imperial Palace at Yedo the minister of the interior Okubo, who had been accused of the desire to compass Saigo's death. The murderers gave themselves up forthwith to the Palace guard. And as if the drama of life of Japan were always destined to assume a startling form, Okubo's body was recognised and picked up by another minister who was going to the Palace. This minister was none other than General Saigo, a younger brother of the Marshal.

After this digression on Marshal Saigo, we come to the events which followed the arrival of foreigners in Japan. For 12 years, from 1857 to 1869, a series of assassinations were committed upon the persons of Europeans. The authors of them were Samourais indignant at the violation of the Imperial soil, and covertly encouraged by the Princes of the South who had resolved on the fall of the Taicoon and who sought to create for him every form of embarrassment. In fact after every crime the European powers, still believing in the Taicoon's sovereignty, sought to obtain from him that satisfaction which he was powerless to afford. The powers then resorted to measures of coercion, and France and England landed marines to protect their countrymen. These remained there till 1874. The cry "Death to the Barbarians" became the watchword of the Samourais. England then sent a squadron to bombard the capital of Satzuma to avenge the Englishmen whose murderers remained unpunished.

The Prince of Nagato, from his batteries at Simonoseki, fired on the European ships which were entering the interior sea of Japan, and as the powers obtained no satisfaction, the British, French and Dutch squadrons united to bombard the town.

The town of Simonoseki is now well known, having given its name two years ago to the treaty of peace between Japan and China. It is a fine military position; it commands the very narrow channel which unites the China Sea with the interior sea of Japan. The batteries which fired on our squadrons thirty years ago were commanded by a man, since become famous, Marshal Yamagata, the Commander-in-chief of the Japanese Army during the war with China.

MARSHAL YAMAGATA.—At the time just alluded to he was the *Karo* of the Prince of Satzouma. In 1872 he became war minister. The reverse of Saigo, who was of a vigorous temperament, Yamagata had the appearance of delicate health. He is a man of great modesty, hiding very great energy under an exterior of timidity.

"I am already too old, said he 25 years ago, to learn what you (Col. Lebon) are teaching cur young officers. I content myself therefore especially with one thing, to know thoroughly the value of each, and to employ him at the post for which he is fitted."

Is not that three parts of the art of command?

Abdication of the Taicoon.

We return now to the time when attempts on the lives of Europeans caused daily conflicts between their governments and that of the Taicoon. The latter found himself daily more and more discredited; and soon the party of the Prince of the South, led by Saigo and his friends, induced the Mikado to summon the Taicoon to divest himself of power.

As was said above the Taicoon abdicated almost at once in February, 1868, and the troops of the Princes of the South entered Yedo without encountering any serious resistance. The partisans of the Taicoon continued the struggle, moving step by step northwards. But the Mikado's crown was not at stake; it was the struggle of two influences. The men of the North, habituated to the exercise of power for centuries, could not tamely see it pass into the hands of the southern men.

As for the Taicoon, one of his councillors who was very devoted to him, pointed out that he could not survive his fall, and that he must rip himself open. Seeing that his prayers were powerless to awake the old sentiment of honour, he hoped to convince by force of example. So he assembled his family and with the usual ceremonial put an end to his life. But even this argument didn't convince the Taicoon, touching though it were. He preferred to retire to a magnificent estate on the border of the sea which the Mikado gave him. After the fall of the Taicoon the victorious southern princes had no further interest in fomenting conflicts between Japan and foreign powers. But the national sentiment had been too much excited to calm itself at once, and further crimes against Europeans were committed, for which the Mikado was now called to account.

THE "DUPLEIX" AFFAIR.—In 1869 the steam pinnace of the French corvette *Dupleix* was waiting at a small port of the interior sea for the French minister who had gone to confer with the Mikado's government. The crew of the pinnace were walking quietly on the bank, when the Samourais of the Prince of Tosa, happening to pass that way, massacred the midshipman in command of the crew and ten of the sailors. The Commander Dupetit-Thouars and the French minister exacted a *vivid satisfaction.* The Mikado's government could no longer oppose delays or plead want of power like that of the Taicoon. In less than five days twenty murderers were arrested and condemned to death, but being Samourais they were allowed to choose the death reserved for nobles, the death not infamous of the *hara-kiri* (ripping one's self open).

Commander Dupetit-Thouars and part of his crew were present at the execution which took place in a temple. These *hara-kiri* are a long and complicated ceremonial which may be summed up in a few words: the culprit, having squatted, slowly divests himself of his clothes down to his hips; he puts them behind him and makes a knot with the sleeves behind the knees. A friend, whom he has chosen, presents to him his short sword; he carries it respectfully up to his forehead, then still with solemn slowness he thrusts the point into his left side and brings it across to the right, giving himself thus a transverse incision. At this moment his friend, who has followed all his movements, rises quickly and in one motion draws his sword from the scabbard and cuts off the condemned man's head.

There is no example in the history of Japan of a Samourai showing any sign of weakness in these executions. It was related at Yedo three years after the Dupleix affair that some of the condemned men, before making the final incision had had the energy to bite off part of their tongues and spit them at the feet of the French sailors. For two long hours Commander Dupetit-Thouars and the French detachment witnessed the lugubrious ceremony. Eleven heads had fallen. Our European nerves are not equal to such prolonged horrors. The Commander, sick with disgust, yet greatly impressed by so much fortitude and fierce energy, intervened, declared that he was content with a number of heads equal to that of the French who had fallen, and demanded the pardon of the survivors.

A few days later the British Minister, on proceeding to the Emperor's palace, was attacked, and ten soldiers of his escort were more or less seriously wounded.

The cup was now full; the European powers became more and more threatening; the Mikado's Court was dazed with fear. The Emperor forthwith published a decree whereby any Samourai who should murder a European, should be degraded, he and all his family, have his goods confiscated, and be deprived of the the honour of the *hara-kiri*.

The Imperial Court now abandoned Kioto where for centuries it had occupied a somewhat isolated spot, and to give emphasis to the new order of things took up its abode at Tokio (Yedo), the ancient capital of the Shoguns, and the real political centre of Japan. There were found the government machinery and bureaucratic staff which had been formed by the Shoguns. Tokio was also near Yokohama where the representatives of foreign powers were all stationed.

In 1871 the Mikado assembled all the Princes, great and small Daimios, declared to them solemnly that their principalities had now become state property, and that henceforth the Mikado would govern alone with his Supreme Council. The old principalities would be transformed into departments administered by prefects, delegated by the central power. In exchange for their principalities the Government would pay the Daimios an annual rent and would undertake the maintenance of the 400,000 men of arms which they had hitherto supported.

A series of political measures completed gradually the destruction of the old feudal edifice. On several occasions local opposition was met with, but the Imperial Government displayed much tact and cleverness, and reforms were not complete until backed by a homogeneous and disciplined army.

The New Army.

In 1871 the Government asked of France the sending of a military mission. Up to that time there had been Satzuma's, Nagato's, Tosa's battalions, &c., but not one soldier directly under the Emperor's authority. It became a question of creating a national army.

Surprise has often been expressed at the address of this invitation to France on the morrow of the events of 1870. Several reasons have been suggested; the most probable one is that the Taicoon had addressed a similar request to Napoleon III which was granted. This mission remained in Japan for 18 months when on the fall of the Taicoon from power it was recalled home. But it left many friends among the Japanese soldiers, of whom a portion, at the time of the revolution, rallied to the Mikado's government. Besides these were Satzuma's men who, as stated above, were being trained by the Comte de Montblanc and his French N.C.O.'s. There was also a strong German party at the Court, but Marshal Saigo's influence prevailed in favour of the French. For the first few months the mission had to steer very cautiously amid many reefs; for the opposite party had declared openly that before six months it would have them sent home. Not only after six months had they not gone, but they had taken root and at the end of the year doubled their numbers. They commenced by forming a nucleus of troops recruited in all the provinces, which were to be the framework of the national army. At first the troops of the southern clans, who had taken the title of Imperial Guards, received no instruction from the Frenchmen. But in their desire to receive it and with the fear of being excelled their jealousy soon broke out, and serious fights took place between them and the troops under instruction. As this feeling continued to grow, the Government sanctioned the participation of the former in the instruction given, but on condition of their consent to manœuvre on the same ground as, and side by side with the other troops. This was a first reconciliation between the feudal and national troops, which was not unattended with difficulty. For instance, the first time about 50 artillery officers were assembled for a lecture, they formed 2 groups in 2 different rooms, and only a threat to cease the instruction prevailed to unite them in one hall. At first their mutual looks were anything but friendly. After 18 months the Government was strong enough to dismiss or at least transform this Imperial Guard, which after having been the instrument of the Taicoon's fall, had now become a force apart in the State. Some of them were transferred to the national army; the others, the reactionaries, went to swell the numbers of the discontented, who in 1877 raised the standard of revolt under Marshal Saigo.

The Imperial Guard was afterwards reconstituted with men drawn from every province of the Empire.

FIRST LAW OF RECRUITMENT.—In 1872 the Japanese Government promulgated this with the help of the French. Obligatory military service was instituted for every Japanese with three years in the active army and four in the reserve. All men, between 17 and 40, and not belonging to the active army or reserve, would compose the territorial army.

This law naturally was only applied progressively, according to the exigencies of the political position and of budgetary resources. It raised every Japanese to the coveted honour of bearing arms and was very cleverly represented by the Government, not as an innovation, but as a return to the ancient laws of the Empire.

Here is the text:—

"We Tenno (Son of Heaven) to our subjects: We believe that formerly, under the ancient absolute and hereditary monarchy, the organisation of the army reposed upon the entire people of Japan. . . . . . Certainly at that time there was no distinction between warriors and peasants. Later, the whole of the military power having fallen into the hands of a single man (Shogun) the division into castes was effected; there was the military class and the inferior class, *i.e.*, the feudal system.

The transformation of our Empire, begun six years ago and still continuing, is therefore, the great reform longed for for more than a thousand years. . . ."

Between 1872 and 1876 the French created the following establishments at Yedo:—

1.—A *school of N.C.O's* as a framework for all arms. At first, it also produced officers.

2.—A *musketry school* for infantry. It was soon discovered that with their unimpressionable temperaments they are good shots. Like all yellow-skins their nervous system seems less developed than ours, or, what comes to the same thing they master it more easily.

3.—A great *military arsenal*, comprising workshops for the construction of material, a manufacture of arms, a pyrotechnical school with a cartridge factory.

Two years after its foundation, this arsenal employed 2,500 men with steam engines and lathes. In 1874, when an expedition to Formosa was undertaken, the number of men rose to 4,000.

The Emperor and Empress both came successively to visit the arsenal. The Emperor was especially astonished at the *chasing* of the metal friction tubes. As for the Empress, who was barely 20, the classic experiments on combustion in oxygen and on detonating mixtures were carried out to her great delight. Doubtless this was her first and last lesson in chemistry.

4.—An *artillery range* was established at 12 leagues from Yedo. The artillery soon had good layers for the same reasons as the infantry. Japanese officers soon regulate their fire with precision, method and coolness being their governing qualities. The range was inaugurated officially in 1873 by the Mikado's uncle. He was present at service practice against infantry formations and field-works, at night firing and at fireworks. What impressed him most was the record of initial velocities by the Le Boulangé chronograph.

5. A gunpowder factory was set up in the environs of Yedo.

6. Numerous barracks were constructed of which one feature deserves mention: arrangements are made so that each man may every day have a hot bath at a temperature of about 104° Fahr. Every Japanese, even the poorest, takes daily a bath, or at least washes himself, with water as hot as he can bear. In the smallest villages in the evening the poor families swarm helter-skelter into the public baths, and every one receives for an insignificant sum a bucketful of boiling water. Taking into consideration the humidity of the climate and the rice-fields among which they live, it is possible that this violent reaction which draws the blood to the skin may be very salutary. In any case the Japanese think it indispensable.

A great *military school* to supply officers of all arms was inaugurated in 1875. The cadets, members for the most part of old Samourai families, showed from the first a keen desire for instruction and a good military spirit. 110 of them were sent to the field of operations to fill up vacancies in the Imperial army when opposed to the rebels under Marshal Saigo. Of these 110 young men under 20 years of age. 32 were killed and 35 wounded—eloquent figures which testify to the bravery, as of yore, which is still the honour of the Samourais.

Finally the French mission was called upon in 1874 to establish a plan of defence for the coasts of Japan. At that time war was on the point of breaking out between China and Japan. Japan had sent an expeditionary corps to occupy Formosa to avenge, they said, the massacre of Japanese sailors. But there is reason to believe that it was principally to get rid of some of the discontented old Samourais, whom they would gladly see colonize Formosa. China expressed her displeasure, and peace was only secured after long parleying. Many Samourais, who henceforward desired war with China, did not pardon the Japanese ambassador the pacific solution, and landing at Yokohama on his return from Pekin he was the object of an attempted assassination.

It may be said generally that the coasts of Japan lend themselves particularly to a good defence, for they are usually steep and inaccessible; the number of points to fortify, that is, where fleets can find shelter, is relatively small. It is easy therefore to concentrate at these points efficient means of defence. On the other hand if an army succeeded, notwithstanding difficulties, in landing elsewhere it would find neither provisions nor roads, but an extremely difficult mountainous country. Finally the victualling of a landed army from the sea would be contingent on the typhoons or cyclones which make these coasts so dangerous.

There remains only to speak of the *military spirit* which animates the new army. We have already seen by the conduct of the 110 cadets that the bravery of the new army yielded in nothing to that of the ancient feudal troops.

Its ardour, even fanaticism for the profession of arms, was always displayed even in the exercises of peace. These sentiments were manifested in night marches where the greater the difficulties the greater the pleasure in overcoming them.

In 1882 the Mikado addressed to his army a proclamation of which a portion is here given:—

"All those who serve in the army ought to regard as their first duty *fidelity to their country* · · · · without patriotism, however well versed in the arts and sciences, soldiers would only be puppets. If they are not faithful, troops even well organized resemble at the moment of action flights of birds. Do not allow yourselves to be carried away by public opinion and do not mix yourselves up in political questions; practice only fidelity to country, which is your first duty, remembering that *duty is heavier than the mountains* and that *death is lighter than a feather*." · · · "In the second place a soldier should rigorously observe *discipline*. Except in cases where the exigences of service demand the exercise of authority, all will endeavour to treat one another with deference and kindness, so that officers and soldiers may be united in the cause of their Sovereign. Every member of the army who, forgetting discipline, destroys that union, either by a want of respect for his chiefs, or by an absence of kindness to his inferiors, would only be a poison for the army and a criminal in the eye of the nation." · · · · "The third virtue is *courage*. If in all time this virtue has been held in such honour in our Empire that not one of our subjects has been able to live without it, how then shall soldiers, whose mission it is to measure themselves with the enemy on the field of battle, how can they forget even for an instant that they ought to possess it. But there are two degrees in this virtue: *small courage* and *great courage* (rashness and bravery). One could not in fact call brave a man with an ardent and turbulent temperament. A soldier should always act with reflection, watch over his character and well weigh all his acts. Do his duty without despising his enemy however weak, without fearing him however strong: such is real courage. · · · · A soldier who on every occasion loves to make a parade of his strength, winds up by being detested by the people and regarded as a wolf." · · · · "In the fourth place soldiers should *observe* scrupulously all *honour and respect* for *their sworn word* · · · · Without these virtues, a soldier cannot remain a single day in the ranks of the army."

Finally, the 5th virtue which the Emperor orders to be practised is *temperance*. "Intemperance once introduced into an army spreads like a contagious disease which attacks even the strongest men."

In the late war, though the Chinese were evidently enemies little to be feared by the Japanese, the latter, as we know, had many occasions for the display of their high military qualities. It has been stated that several officers voluntarily killed themselves, because they believed they had not sufficiently well done their duty. One notable case was that of an officer who was hindered by indisposition from being present at the engagements which preceded the taking of Port Arthur, and who died by his own hand as being dishonoured.

In terminating this sketch we must ask ourselves if the military qualities which Japan possesses to such a high degree are not likely to disappear, or at least sensibly diminish, in proportion as the troops, instead of being recruited among the old Samourais, are drawn from all classes of the population. The future will show. But if it is to be otherwise, if the Japanese army is always to be animated by the same spirit, it is clear that when Japan has developed her military and naval strength in proportion to her forty millions of inhabitants—on that day, she will not be only, as she is now, unassailable at home—she will become an offensive power of whom very serious account must be taken. According to circumstances she will be for her neighbours either a redoubtable foe or a precious ally.

Her neighbours, they are first of all China and Russia; afterwards England, on account of her numerous stations in the far East; finally France, for it must not be forgotten that Formosa is now Japanese territory, and that Annam and Tonquin are but three days sail from there.

NOTES

FROM

CORRESPONDING MEMBERS.

"DUNCAN" GOLD MEDAL PRIZE ESSAY, 1899.

The Committee will be glad to receive suggestions for the "Duncan" Essay, 1899; they should be connected with Garrison Artillery. A list of suggested subjects will be printed and sent to messes a few days previous to the Annual General Meeting in order that members may come prepared to vote.

Annual General Meeting.

The Annual General Meeting of the Royal Artillery Institution will take place at 3 p.m. on Friday, 3rd June, 1898, in the Lecture Theatre, R.U.S.I, Whitehall. It will be followed by the consideration of the R.A. Charities and Games' Fund.

Anyone wishing to bring a matter before the the meeting is requested to communicate with the Secretary of the Fund concerned.

List of additions to the Library during the month of April, 1898.

PRESENTED.	BY WHOM.
Instructions for Practice: Horse, Field, and Mountain Artillery, 1898	Secretary of State.
Army (annual) Act, 1898. 2 copies ...	
Regulations for the Militia, 1898	
Instructions for Armourers, 1897	
Handbook for Derricks, Sheers, and Holdfasts, 1898	
Colored Lithographs; R.C.D. 252; R.L. 251	
The Smithsonian Institution, 1846-1896: The history of its first half century; edited by Geo. Brown Goode	Smithsonian Institution.
Smithsonian Miscellaneous Collections, No. 1084. "Bibliography of the Metals of the Platinum Group," 1748-1896	
Science and Engineering during the Victorian Era, 1837-1897; by Charles Bright, F.R.S.E.	The Author.

PURCHASED.

L' Armée Francaise (illustrated), 1898.

Les Anglais en Egypte. Apercu de la situation.

Dictionary of National Biography, Vol. 54.

German-English Dictionary, Part II; by Professors Muret and Sanders.

Uniformenkunde Lose Blätter zur Geschichte der Entwicklung der Militärischen Tracht; von Richard Knötel.

The Niger Sources; by Lieut.-Col. J. K. Trotter, R.A., 1898.
Monograph of the Turdidae, cr Family of Thrushes (Part II).
Annuaire de Armée Francaise pour 1898.

THE folloing works are now on sale at the R.A. Institution and will be forarded post free at the prices noted after their titles below:—

"Twenty-four hours of Moltke's Strategy" by Fritz Hoenig. Translated by Colonel N. L. Walford, price 5s.

"The Shrapnel Fire of the Field Artillery" by Major-General Rohne. Translated by Colonel N. L. Walford, price 2s. 6d.

Major-General Stubbs's "List of Officers of the Bengal Artillery," price 5s. 3d.

"Field Artillery Fire," by Captain W. L. White, R.A., price 1s. 2d.

"Ranging Note-Book," by Captain S. W. Lane, R.A., price 1s. 1d.

"Achievements of Field Artillery," by Major E. S. May, R.A., bound, price 2s. 6d.

"The Value of Mobility for Field Artillery," by Major E. S. May, R.A., paper covers, price 3d.

"The Young Officer's 'Don't,' or Hints to Youngsters on Joining," by an Officer R.A., price 7d.

Examination questions in (*c*), (*d*), (*e*) and (*g*) set in the five examinations ending November 1897:—

Captains (*c*), (*d*) and (*g*) ... price 1s. 1d.
Lieutenants (*c*), (*d*), (*e*) and (*g*) price 1s. 1d.

Tables of Four-Figure Logarithms, pocket edition, mounted on linen, price 3d.

"Notes on the early history of the Royal Regiment of Artillery," by the late Colonel Cleaveland, R.A., price 2s.

"Ballistic Tables with an explanation," by A. G. Hadock, late R.A., price 5s. each, subject to a large discount to members of the R.A.I.

Presentations to R.A Mess, Woolwich.

LADY GARDINER has recently presented to the Royal Artillery for the Mess at Woolwich two oil pictures by Hurlstone, President of the Society of British Artists, portraits of Sir Robert Gardiner and Sir John McLeod who were father and grandfather respectively to her late husband Sir Lynedoch Gardiner, K.C.V.O., C.B., Colonel-Commandant R.H.A. The portrait of Sir Robert was painted for Sir Lynedoch who spent in that way a tip which was given him when he first got his commission.

Readers of "Proceedings" will remember the account of Sir John McLeod and his services in and on behalf of the Regiment which appeared in the number for July, 1895, under the title of "The Centenary Cup"; and there is an excellent account of Sir Robert Gardiner's services contained in two letters from Sir Lynedoch published in the number for August, 1893.

Lady Gardiner in making this present feels sure that the memory of the men will live long and their pictures be rightly placed at the head-quarters of the regiment of which they were both so proud.

The Mess Committee have hung them in a very good light on the North wall of the Mess reading room.

MALTA.

COUNTING our year, as we do, from the 1st of May to the 31st of April, that is from the beginning of the leave season till the end of the drill season, the gunners here have had a most successful time.

In July, 1897, a gunner team won the Handicap Polo Tournament and in September the Garrison Cricket Cup, as reported in a previous number.

Since then we have won the Governor's Cup boat race for the second year in succession, beating our solitary opponents—the Royal Malta Militia—with great ease. Our crew was Major Carden, Captains Playfair (cox.) and Gurdon, Lieutenants Galwey (stroke), F. M. Rickard, G. H. Rickard and Tovey (bow).

Major Lardner-Clarke accounted for the Golf Club Scratch Challenge Cup for which Captain Playfair was second.

A newly-instituted Challenge Cup for Inter-regimental Lawn Tennis Doubles next fell into our hands, two R.A. pairs fighting out the final, victory resting with Lieuts. Muspratt-Williams and Tovey.

Last, but not least, the long-wished-for Polo Cup adorns our table. Long may it remain there! With our usual luck we lost our back, Forman, shortly before the tournament, but Captain Burnett, who has led a sedentary life for many years, was roused to throw himself into the breach and by hard training brought himself fit to the post, to take his place.

Eight teams entered, the H.L.I., Rifle Brigade, 33rd, Dorsets, Suffolks, Navy, R.A. and R.E. The R.B. beat H.L.I. 6 to 2, the 33rd beat the Navy 14 to 2, the R.E. beat the Suffolks 4 to 2, and the R.A. the Dorsets 4 to love.

In the semi-finals the Rifle Brigade beat the 33rd after a very fine game by 5 to 4, in which they had the better of the luck; and the R.A. beat the R.E. very easily by 9 to 1.

In the finals the R.A. beat the Rifle Brigade easily by 7 goals to 1. The first two quarters very fairly even but after that the Rifle Brigade became somewhat demoralized. For us, Captain Hickie, who was beautifully mounted, played a fine, dashing, forward game. Our team consisted of—

1.—Captain Hickie.
2.—Mr. Robinson.
3.—Mr. Price Lewes.
Back.—Captain Burnett.

Much of our success was due to our Polo Club, started after last year's tournament by Lieut. Forman, which placed six good ponies at the disposal of the team a month before the tournament.

The R.A. Subalterns' Challenge Cup, to which Major Churchward kindly added a cup to become the property of the winner, was won by Mr. Robinson's "Elegy."

We would like a few good cricketers sent out shortly in order to keep the Cricket Cup in the Mess, as we have lost the greater part of last year's XI.

To conclude this list of Royal Artillery successes, Mr. Robinson, at the recent races, won the "Club Challenge Cup" with his pony "Elegy"; this is a much coveted trophy and has never previously been won by us.

The R.A. Drag Hounds.

IT may interest many officers out of reach of Woolwich to hear how the Drag Hounds have done during the past season, especially as regards the number of runs it has been a "record."

Captain Paget on promotion handed them over last season to Captain Wing;

who shortly afterwards was ordered off to Newbridge. Captain J. Hanwell then became Master, with Lieutenants Cairnes and Learmonth as Whips, the two latter went on leave on the 1st January and were re-placed by Lieutenants Sandars and Lamont, who carried on till the end of the season.

Mills, who became kennel huntsman on the death of poor old Babbage, has done remarkably well, and kept his hounds in good condition.

Driver Guest, who has re-placed Grainger as runner, has also done very well indeed, having run well and made but very few mistakes.

In October we had four bye days; once after hares round Well Hall, where the hounds promptly accounted for two. Mr. Russell, thinking there would be none left for another day then asked the master to spare the rest of his stock.

The landowners and farmers dined at Mess on Saturday the 30th October, Sir Patteson Nickalls and Mr. May returning thanks.

The opening meet took place at the Mess on Tuesday the 2nd November, when we ran the Well Hall line. Owing to the want of rain the ground was very hard, so the next few runs were fixed for the Cray Valley and the Marshes.

On the 18th November Mr. Armstrong kindly asked the Hunt to lunch at Horton Kirby, when we had a run over the Farningham line.

On the 26th November 20 of us went to Westerham by special train, and had a real good run of about five or six miles all grass and perfectly straight up to Dunton Green.

On the 3rd December we paid a visit to Upminster, where a good number of local people joined in, the line was kindly arranged by Messrs R., J. and W. Eve, and Mr. Mathews. On 24th December we were stopped by frost, but this proved to be the only day lost during the whole season.

The two best runs of the season were at Tonbridge on the 7th January and 11th March. On each occasion we went down by special train in great force and lunched with Mr. Leonard Powell (of Chiselhurst) at the Rose and Crown. Mr. Powell had also invited the land-owners, who all seemed delighted to see us. After lunch and speeches the riding was a bit wild, and the tail hounds had a bad time; there were about 60 riding, and a huge crowd of spectators, on the second occasion numbering nearly a thousand; some brooks caused much grief and amusement. On the 12th January we were all invited to lunch with Sir Patteson Nickalls at Chislehurst, and had a good run in Scadbury Park, and all about the Old Eltham race course. We had three other good runs in Essex, one at East Horndon arranged by Mr. Herbert Cole, another near Belhus Park and the third near Laindon arranged by Mr. Dalton, over the Essex Union Point to Point Course.

The best home lines are still Orpington, Mottingham Lane, Farningham, and Bromley.

The following lines were run during the season:—

In October	4	Brought forward	25
Bexley and Foots Cray	5	Well Hall	3
Danson and Shooters' Hill	2	Marshes	4
Scadbury Park	1	Farningham	3
Bromley	3	Westerham	2
Orpington	4	Essex	4
Chislehurst	2	Mottingham Lane	3
Tonbridge	2	Eltham	3
Dartford	1	Lamorbey	2
Match v. Staff College Hounds ...	1	Trial on Marshes	1
Carried forward	25	Grand Total	50

Towards the end of the season the ground again got hard, but not too bad to stop us altogether. On the 11th April the hounds had a trial on the marshes, and all the slow ones were cast.

On the 15th April the season ended with a glorious victory over the Staff College hounds. Captain England and the kennel huntsman arrived on the 14th with four couple, and the match took place the next morning. The course was about three miles long, laid so that the hounds could not cut off any corners and different to any that our hounds were used to; our hounds wore blue ribbons so as to distinguish them more easily; betting even money, both hunts equally sure of their own hounds winning. The rival masters laid on the combined pack, which got off all well together. The finish resulted in a complete victory for the R.A. as follows:—

R.A. Hounds.	Staff College Hounds.
1st.	4th.
2nd.	9th.
3rd.	10th.
5th.	11th.
6th.	12th.
7th.	14th.
8th.	15th.
13th.	16th.
45	91

This was a grand finish to the season, and shows our hounds are fast and fit, thanks to Captain Hanwell's careful selection and Mills's kennel management.

Out of ten couple of last season's hounds and eight couple of new ones, there now remain nine couple, which take a lot of catching and are all good looking. Lord Portman, Lord Eglington, Mr. Wrangham and Mr. Pennefather have very kindly sent us some good hounds during the season, especially the last, no less than three of his being in our select eight against the Staff College.

There were luckily but few accidents during the season, and none due to wire which speaks well for the way in which the lines were walked and marked. Our Master who only missed two runs during the whole season had the misfortune to kill his best horse "Puff" who won the R.A. Welter Steeplechase in '96 and was favorite for the Gold Cup last year. The whips went well and were always well up at a check or finish.

Besides the hunt servants the following were the most regular attendants:—

Colonel Lockhart, Colonel Hannay; Majors Holland, Burton, Cowan, and Lecky; Captains Ferrar, Biddulph, Perceval, and Slee; Lieuts. Wilson, Wood, Wellesley, Powell, Hill, Pringle, Davies, Stanton, Parsons, Becke, Scott, Blois, Edwards, Metcalfe and Burne. The only ladies were Mrs. Hanwell and Mrs. Ferrar, both of whom were always well up. The Royal Dragoons were generally represented by Captain Burns and Lieuts. Glyn and Russell, and the A.S.C. by Colonel Johnson. It is to be regretted that the distant meets, although much the best, were invariably less patronised than those close at home, which is strong presumptive evidence that the rising generation is not keen enough to undertake a long hack.

The master will be much obliged to any officers who can obtain any good dog hounds before next season. Rioters, babblers, or hounds which won't draw cover are not objected to, but they must be fast, bold and good looking. A Silver Cup will be given to the officer who obtains the best hound, provided the hunt is put to no expense, except railway fare. Hounds which the hunt have to pay for will be thankfully received, but will not count in the competition for the Cup.

Obituary.

LIEUT.-COLONEL F. R. DE BUDE (retired), whose death occurred at Hastings on 23rd March, 1898, joined the Bengal Artillery as 2nd Lieut., 13th June, 1845; became Lieut., 3rd September, 1848; Captain, 18th February, 1861; Major, 5th August, 1864, and retired on full pay with the hon. rank of Lieut.-Colonel, 1st August, 1872.

Lieut.-Colonel de Budé served in the Punjab Campaign 1848-9, siege of Mooltan, battle of Goojerat (medal with 2 clasps). Indian Mutiny, 1857 (medal). N. W. Frontier Campaigns. Kabul Khel Wuzeeree Expedition 1859-60; action of Wydanee; Mahsud Wuzeeree Expedition 1860; forcing of Barrara Pass, affair at Makeen (medal, with clasp). Eusofzai Expedition, 1863; forcing of Umbeyla Pass, defence of the Eagle's Nest Picquet and taking of Laloo. (Despatches, *London Gazette,* 19 March, 1864, Brevet of Major; clasp.) Black Mountain Expedition, 1868; attack on Muchaie Peek (in command of 3 batteries). (Despatches, *London Gazette,* 15th June, 1869).

LIEUT.-COLONEL W. DELANE (retired), who died on 3rd April, 1898, was first commissioned in the Bengal Artillery as 2nd Lieut., 13th December, 1845; became Lieut., 18th March, 1852; Captain, 27th August, 1858; Major, 5th July, 1872, and retired on full pay with the hon. rank of Lieut.-Colonel, 1st August, 1872.

Lieut.-Colonel Delane served in the Punjab Campaign of 1848-9, including the battles of Chillianwallah and Goojerat; at the latter engagement he had his horse shot. He was also in the cavalry and artillery pursuit of the Sikhs and Afghans to Peshawar (medal with two clasps). He served in the Eusofzai district in 1849 with Brigadier Bradshaw's force, and with Sir Charles Napier's force at the forcing of the Kohat Pass in 1850 (medal with clasp). Served in the Indian Mutiny in 1857, and again had his horse killed under him (medal).

MAJOR-GENERAL G. GRAYDON (retired), died at Upper Norwood on 1st April, 1898. He was commissioned as 2nd Lieut., 18th December, 1835; became Lieut., 23rd March, 1838; 2nd Captain, 1st April, 1846; Captain, 11th November, 1851; Lieut-Colonel, 7th June, 1856; Colonel, 7th June, 1861, and retired on full pay with the hon. rank of Major-General, 19th August, 1867.

General Graydon served in the Crimean campaign including the siege of Sebastopol and the Expedition to Kertch (medal with clasp and Turkish medal).

CAPTAIN C. A. MOLONY, who died of wounds received in action in Uganda, was first commissioned as 2nd Lieut., 16th February, 1887; became Lieut., 16th February, 1890, and Captain, 9th October, 1897.

Captain Molony served in the Hazara Expedition, 1891, and the Hunza-Nagar Expedition, 1891-92 (mentioned in despatches, medal with clasp). Uganda 1897 operations in Nandi and Kabowoko.

CAPTAIN C. E. ROLT, whose death occurred suddenly at Fort Rowner, Gosport, 10th April, 1898, joined the Regiment as Lieut. 28th July, 1883, and became Captain 1st April, 1892.

INTER-REGIMENTAL
RACKET AND BILLIARD MATCHES

R.A. *v.* R.E.

Played at Chatham, April 1st and 2nd, 1898.

BILLIARDS.

THIRD PAIR PLAYED AT 4.30 P.M., 1ST APRIL.

R.A.		**R.E.**
LIEUT. B. ATKINSON	beat	LIEUT. J. J. H. NATION.
300 in 47 cues.		166.
Best breaks 31, 26, 25, 20, 19, 18, 15, 14, 14, 12, 10, 10.		Best breaks 34, 15, 13.

FIRST PAIR PLAYED AT 10 P.M., 1ST APRIL.

MAJOR F. A. CURTEIS	beat	LIEUT. J. R. White.
300 in 37 cues.		152.
Best breaks 29, 28, 27, 23, 19, 19, 18, 18, 18, 14, 13, 12.		Best breaks 23, 15, 14, 13, 12, 12

SECOND PAIR PLAYED AT 11.20 P.M. 1ST APRIL

CAPTAIN T. A. TANCRED	beat	LIEUT. G. O. BIGGE.
300 in 54 cues.		280.
Best breaks 26, 21, 20, 20, 17, 15, 14, 14, 11.		Best breaks 35, 30, 22, 17, 15, 10, 10.

The R.A. won all three events and retain the Cup for the coming year.

DOUBLE RACKETS.

FOUR-HANDED MATCH PLAYED AT 2.30 P.M., 1ST APRIL.

R.A.		**R.E.**
CAPTAIN A. M'N. COOPER-KEY. 2ND LIEUT. W. L. FOSTER.	beat	CAPTAIN W. C. HEDLEY. 2ND LIEUT. R. OAKES.

1st Game.	*2nd Game.*	*3rd Game.*	*4th Game.*
R.A. 15.	R.A. 15.	R.A. 15.	R.A. 15.
R.E. 5.	R.E. 6.	R.E. 2.	R.E. 13.

SINGLE RACKETS.

FIRST MATCH PLAYED AT 11.0 A.M., 2ND APRIL.

R.A.		**R.E.**
2ND LIEUT. W. L. FOSTER	lost to	CAPTAIN W. C. HEDLEY.

1st Game.	*2nd Game.*	*3rd Game.*
R.A. 15 (set 3).	R.A. 5.	R.A. 14 (set 3).
R.E. 17.	R.E. 15.	R.E. 17.

SECOND MATCH PLAYED AT 11.50 A.M., 2ND APRIL.

CAPTAIN A. M'N. COOPER-KEY beat 2ND LIEUT. R. OAKES.

1st Game.	*2nd Game.*	*3rd Game.*	*4th Game.*
R.A. 15	R.A. 15.	R.A. 13 (set 3).	R.A. 15.
R.E. 8.	R.E. 12.	R.E. 16.	R.E. 10.

The R.A. won two out of the three events and retain the Cup for the coming year.

R.A. & R.E. Annual Racket and Billiard Matches.

The results of the Racket and Billiard Matches up to and including the present year are shewn below :—

1873.

Rackets.		*Billiards.*	
Double. R.A. 1.	R.E. 4.	*Double.* R.A. 500.	R.E. 497.
Lieut. W. E. Denison.	Lieut. L. K. Scott.	Lieut.-Col. Drayson.	Capt. Seton.
〃 W. L. Davidson.	〃 M. Maycock.	Major Maitland.	〃 Mant.
Single. R.A. 2.	R.E. 3.	*Single.* R.A. 500.	R.E. 361.
Lieut. W. L. Davidson.	Lieut. M. Maycock.	Major Maitland.	Capt. Mant.

1874.

Rackets.		*Billiards.*	
Double. R.A. 4.	R.E. 1.	*Double.* R.A. 500.	R.E. 492.
Major Newman.	Lieut. L. K. Scott.	Major Maitland.	Capt. Warburton.
Lieut. Crookenden.	〃 Tower.	Lieut. Anstruther.	〃 Seton.
Single. R.A. 0.	R.E. 3.	*Single.* R.A. 370.	R.E. 500.
Lieut. Crookenden.	Lieut. Tower.	Major Maitland.	Capt. Warburton.

1875.

Rackets.		*Billiards.*	
Double. R.A. 0.	R.E. 4.	*Double.* R.A. 500.	R.E. 494.
Capt. Anderson.	Lieut. Tower.	Capt. Hazlerigg.	Major Warburton.
Lieut. Crookenden.	〃 *Hon.* M. G. Talbot.	Lieut. Anstruther.	Capt. Skinner.
Single. R.A. 0.	R.E. 3.	*Single.* R.A. 286.	R.E. 500.
Capt. Anderson.	Lieut. Tower.	Lieut. Anstruther.	Major Warburton.

1876.

Rackets.		*Billiards.*	
Double. R.A. 3.	R.E. 4.	*Double.* R.A. 500.	R.E. 451
Major Murdoch.	Lieut. Penrose.	Capt. Hutchinson.	Major Warburton.
Lieut. Anstruther.	〃 Onslow.	Lieut. Anstruther.	Capt. Skinner.
Single. R.A. 1.	R.E. 3.	*Single.* R.A. 479.	R.E. 500.
Major Murdoch.	Lieut. Penrose.	Lieut. Anstruther.	Major Warburton.

1879.

Rackets.		*Billiards.*	
Double. R.A. 4.	R.E. 0.	*Double.* R.A. 500.	R.E. 430.
Capt. Griffiths.	Capt. L. K. Scott.	Major Hutchinson.	Major Seton.
Lieut. D. C. Carter.	Lieut. W. A. Cairnes.	Capt. Anstruther.	Capt. Glancy.
Single. R.A. 3.	R.E. 1.	*Single.* R.A. 500.	R.E. 421.
Lieut. D. C. Carter.	Lieut. W. A. Cairnes.	Capt. Anstruther.	Capt. Glancy.

1880.

Rackets.		*Billiards.*	
Double. R.A. 4.	R.E. 0.	*Double.* R.A. 500.	R.E. 430.
Lieut. King.	Lieut. R. Hedley.	Major Hutchinson.	Major Manderson.
〃 Cooper-Key.	〃 W. A. Cairnes.	Capt. Anstruther.	Capt. Glancy.
Single. R.A. 0.	R.E. 3.	*Single.* R.A. 458.	R.E. 500.
Lieut. D. C. Carter.	Lieut. W. A. Cairnes.	Capt. Anstruther.	Major Manderson.

1881.

Rackets.

Double. R.A. 4.	R.E. 0.
Lieut. King.	Lieut. M. Maycock.
" Cooper-Key.	" W. A. Cairnes.
Single. R.A. 3.	R.E. 1.
Lieut. Cooper-Key.	Lieut. W. A. Cairnes.

Billiards.

Double. R.A. 500.	R.E. 392
Major Hutchinson.	Capt. Glancy.
Capt. Anstruther.	" Broadfoot.
Single. R.A. 500.	R.E. 468.
Capt. Anstruther.	Major Mant.

1882.

Rackets.

Double. R.A. 4.	R.E. 2.
Lieut. C. D. King.	Lieut. Tower.
" Cooper-Key.	" Friend.
Single. R.A. 3.	R.E. 1.
Lieut. Cooper-Key.	Lieut. Tower.

Billiards.

Double. R.A. 300.	R.E. 252.
Col. Maitland.	Major Seton.
Lieut. Bruen.	Major Glancy.
Single. R.A. 500.	R.E. 437.
Col. Maitland.	Major Seton.

1883.

Rackets.

Double. R.A. 1.	R.E. 4.
Lieut. C. D. King.	Lieut. Tower.
" Cooper-Key.	" Friend.
Single. R.A. 1.	R.E. 3.
Lieut. C. D. King.	Lieut. Tower.

Billiards.

Double. R.A. 267.	R.E. 300.
Col. Maitland.	Lieut. Bor.
Capt. Anstruther.	Lieut. Dumbleton.
Single. R.A. 500.	R.E. 297.
Capt. Anstruther.	Lieut. Dumbleton.

1884.

Rackets.

Double. R.A. 3.	R.E. 4.
Lieut. Cooper-Key.	Lieut. Tower.
" C. D. King.	" Friend.
Single. R.A. 2.	R.E. 3.
Lieut. Cooper-Key.	Lieut. Tower.

Billiards.

Double. R.A. 277.	R.E. 300.
Lieut.-Col. Hazlerigg.	Lieut. Dumbleton.
Capt. Anstruther.	Capt. Digby.
Single. R.A. 500.	R.E. 398.
Capt. Anstruther.	Lieut. Dumbleton

1885.

Rackets.

Double. R.A. 4.	R.E. 2.
Lieut. Cooper-Key.	Capt. Friend.
" C. D. King.	Lieut. Hamilton.
Single. R.A. 3.	R.E. 1.
Lieut. Cooper-Key.	Capt. Friend.

Billiards.

Double. R.A. 300.	R.E. 274.
Major Anstruther.	Capt. Digby.
Capt. MacMahon.	" Baddeley.
Single. R.A. 500.	R.E. 248.
Major Anstruther.	Capt. Digby.

1890.

Rackets.

Double. R.A. 1.	R.E. 4.
Captain Cooper-Key.	Lieut. Hedley.
Lieut. Simonds.	" Sheppard.
Single. R.A. 0.	R.E. 3.
Captain Cooper-Key.	Lieut. Hedley.

Billiards.

Double. R.A. 235.	R.E. 300
Major Anstruther.	Captain Digby.
Lieut. Lachlan.	" Dumbleton.
Single. R.A. 500.	R.E. 489.
Major Anstruther.	Captain Dumbleton.

1891.

Rackets.

Double. R.A. 2.	R.E. 4.
Captain Cooper-Key.	Captain Hedley.
2nd Lieut. Galloway.	2nd Lieut. Sheppard.
Single. R.A. 3.	R.E. 2.
Captain Cooper-Key.	Captain Hedley.

Billiards.

Double. R.A. 300.	R.E. 250
Major Anstruther.	Colonel Glancy.
Lieut. Pollock.	Capt. Hedley.
Single. R.A. 414.	R.E 500.
Major Anstruther.	Colonel Glancy

25

1892.

Rackets.

Double.	R.A. 4.	R.E. 0.
	Captain Cooper-Key. Lieut. Quinton.	Captain Hamilton. Lieut. Blair.
Single.	R.A. 3.	R.E. 0.
	Captain Cooper-Key.	Captain Hamilton.

Billiards.

Double.	R.A. 300.	R.E. 291.
	Captain Curteis. Captain Pollock.	Colonel Glancy. Captain Roberts.
Single.	R.A. 500.	R.E. 469.
	Captain Pollock.	Colonel Glancy.

1893.

Rackets.

Double.	R.A. 4.	R.E. 1.
	Captain Cooper-Key. Lieut. Quinton.	Captain Hamilton. Lieut. Blair.
Single.	R.A. 2.	R.E. 3.
	Captain Cooper-Key.	Captain Hamilton.

Billiards.

Double.	R.A. 231.	R.E. 300
	Major Curteis. Captain Pollock.	Major Dorward, D.S.O Lieut. Jones.
Single.	R.A. 500.	R.E. 303.
	Major Curteis.	Major Dorward, D.S.O.

1894.

Rackets.

Double.	R.A. 1.	R.E. 4.
	Captain Cooper-Key. Captain C. D. King.	Captain Hamilton. Lieut. Blair.
1 Single.	R.A. 3.	R.E. 1.
	Captain Cooper-Key.	Captain Hamilton.
2 Single.	R.A. 0.	R.E. 3.
	Lieut. Quinton.	Lieut. Blair.

Billiards.

1 Single.	R.A. 255.	R.E. 300.
	Captain Vans-Agnew.	Major Dorward, D.S.O.
2 Single.	R.A. 285.	R.E. 300.
	Major Curteis.	Lieut. Jones.
3 Single.	R.A. 300.	R.E. 134.
	Captain Lachlan.	Major Ruck.

1895.

Rackets.

Double.	R.A. 3.	R.E. 4.
	Captain Cooper-Key. Lieut. Quinton.	Captain Hamilton. Lieut. Blair.
1 Single.	R.A. 3.	R.E. 2.
	Captain Cooper-Key.	Captain Hamilton.
2 Single.	R.A. 3.	R.E. 2.
	Lieut. Perkins.	Lieut. Blair.

Billiards.

1 Single.	R.A. 300.	R.E. 210.
	Captain Lachlan.	Lieut.-Col. Dorward
2 Single.	R.A. 288.	R.E. 300.
	Lieut. Seligman.	Captain Dumbleton.
3 Single.	R.A. 300.	R.E. 297.
	Major Curteis.	Lieut. Sladen.

1896.

Rackets.

Double.	R.A. 4.	R.E. 1.
	Captain Cooper-Key. 2nd Lieut. Foster.	Captain Hamilton. Captain Hedley.
1 Single.	R.A. 3.	R.E. 2.
	Captain Cooper-Key.	Captain Hamilton.
2 Single.	R.A. 3.	R.E. 1.
	2nd Lieut. Foster.	Captain Hedley.

Billiards.

1 Single.	R.A. 291.	R.E. 300.
	Major Curteis.	Lieut. Sladen.
2 Single.	R.A. 281.	R.E. 300
	Lieut. Sykes.	Lieut.-Col. Dorward
3 Single.	R.A. 300.	R.E. 276
	Lieut.-Col. Davidson.	Captain Roberts.

1897.

Rackets.

Double.	R.A. 4.	R.E. 0.
	Captain Cooper-Key. 2nd Lieut. Foster.	Major Friend. Captain Hedley.
1 Single.	R.A. 3.	R.E. 1.
	2nd Lieut. Foster.	Captain Hedley.
2 Single.	R.A. 3.	R.E. 1.
	Captain Cooper-Key.	Major Friend.

Billiards.

1 Single.	R.A. 300.	R.E. 185.
	Captain Tancred.	Captain Norton.
2 Single.	R.A. 300.	R.E. 213.
	Major Curteis.	Captain Hedley.
3 Single.	R.A. 300.	R.E. 200.
	Lieut. Atkinson.	Lieut. Nation.

1898.

Rackets.

Double.	R.A. 4	R.E. 0.
	Captain Cooper-Key. 2nd Lieut. Foster.	Captain Hedley. 2nd Lieut. Oakes.
1 Single.	R.A. 0.	R.E. 3.
	2nd Lieut. Foster.	Captain Hedley.
2 Single	R.A. 3.	R.E. 1.
	Captain Cooper-Key	2nd Lieut. Oakes

Billiards.

1 Single.	R.A. 300.	R.E. 152.
	Major Curteis	Lieut. White.
2 Single.	R.A. 300.	R.E. 280.
	Captain Tancred	Lieut. Bigge.
3 Single	R.A. 300	R.E. 166.
	Lieut. Atkinson	Lieut. Nation.

DIARY OF FIXTURES.

MAY.

Day of the		Regimental.	Cricket, &c.	Private.
Mth	Wk.			
1	**S**	... ...	... ...	... ...
2	M	... ...	... ...	... ...
3	T	... ...	... ...	... ...
4	W	... ...	... ...	... ...
5	Th	... ...	... ...	... ...
6	F	... ...	Kempton Park "Jubilee" Meeting.	... ...
7	S	2nd Dn, (R.H.A. Aldershot) arrives at Shoeburyness.	do do	... ...
8	**S**	... ...	... ...	... ...
9	M	... ...	... ...	... ...
10	T	... ...	Newmarket 2nd Spring Meeting begins.	... ...
11	W	... ...	... ...	... ...
12	Th	... ...	... ...	... ...
13	F	... ...	... ...	... ...
14	S	1st Dn. R.H.A. arrives at Glenbeigh. 3rd Dn. (F.A. Newcastle) arrives at Shoeburyness. 2nd Dn. arrives at Wn. Forts.	... ...	... ...
15	**S**	... ...	... ...	... ...
16	M	... ...	... ...	... ...
17	T	... ...	... ...	... ...
18	W	.. ...	... ...	... ...
19	Th	... ...	... ...	... ...
20	F	Ball at R.A. Mess, Woolwich	... ...	... ...
21	S	4th Dn. (F.A. 2nd Bde. Dn. Woolwich) arrives at Shoeburyness.		
22	**S**	... ...	... ...	... ...
23	M	... ...	... ...	... ...
24	T	... ...	Epsom Races begin.	... ...
25	W	... ...	DERBY. R.A. v. Aldershot at Aldershot.	... ...
26	Th	2nd Dn. (F.A. 2nd Bde. Dn. Aldershot) arrives at Okehampton.	do do	... ..
27	F	... ...	OAKS.	.. ...
28	S	5th Dn. (F.A. 3rd Bde. Dn. Woolwich) arrives at Shoeburyness.	... ...	... ...
29	**S**	Whit Sunday	... ...	... ...
30	M	Bank Holiday	... ...	... ...
31	T	2nd Dn. (F.A. mixed) arrives at Glenbeigh.	... ...	... ...

Wn = Western.

JUNE.

Day of the				
Mth	Wk.	Regimental.	Cricket, &c.	Private.
1	W	... ...	... ...	... ...
2	Th	... ...	... ...	... ...
3	F	Annual General Meeting R.A.I. at R.U.S.I. Whitehall 3 p.m.	REGIMENTAL R.A. *v.* Eton Ramblers at Woolwich.	DINNER ... ...
4	S	3rd Dn. arrives at Wn. Forts. 6th Dn. (F.A. 1st Bde. Dn. Woolwich) arr. Shoeb'yness	do do	... ...
5	**S**	... ...	... ...	... ...
6	M	... ...	... ...	... ...
7	T	... ...	... ...	... ...
8	W	... ...	... ...	... ...
9	Th	... ...		... ...
10	F	... ...	R.A. *v.* Butterflies at W'lwich	... ...
11	S	7th Dn. (F.A. Colchester) arrives at Shoeburyness.	do do	... ...
12	**S**	... ...	... ...	... ...
13	M	... ...	... ...	... ...
14	T	... ...	Ascot begins	... ...
15	W	... ...	... ...	... ...
16	Th	... ...	... ...	... ...
17	F	... ...	R.A. *v.* R.E. at Chatham.	... ...
18	S	3rd Dn. (R.H.A. mixed) arrives at Okehampton. 8th Dn. (F.A. Weedon) arrives at Shoeburyness.	do do	... ...
19	**S**	... ...	... ...	... ...
20	M	... ...	R.A. *v.* M.C.C. at Lord's.	... ...
21	T	3rd Dn. (F A. Athlone) arrives at Glenbeigh.	do do	... ...
22	W	... ...	R.A. *v.* Yorkshire Gentlemen at Woolwich.	... ...
23	Th	... ...	do do	... ...
24	F	... ...	... ...	... ...
25	S	... ...	... ...	... ...
26	**S**	... ...	... ...	... ...
27	M	... ...	... ...	... ...
28	T	... ...	Newmarket 1st July Meeting begins.	... ...
29	W	... ...	... ...	... ...
30	Th	... ...	Oxford *v.* Cambridge begins	... ...

Wn=Western.

JULY:

Day of the				
Mth.	**Wk.**	**Regimental.**	**Cricket, &c.**	**Private.**
1	F	2nd Dn. Siege arrives at Lydd	... ...	... ...
2	S	4th Dn. arrives at Wn. Forts.	... ...	... ...
3	**S**	... ...	... ...	... ...
4	M	... ...	... ...	... ...
5	T	... ...	... ...	... ...
6	W	... ...	... ...	... ...
7	Th	... ...	... ...	... ...
8	F	... ...	Eton *v.* Harrow. R.A. *v.* B.B. Woolwich.	... ...
9	S	... ...	do do	... ...
10	**S**	... ...	... ...	... ...
11	M	... ...	... ...	... ...
12	T	... ...	Newmarket 2nd July Meeting begins.	... ...
13	W	4th Dn. (F.A. Exeter) arrives at Okehampton.	... ...	... ...
14	Th	... ...	... ...	... ...
15	F	... ...	R.A. *v.* Household Bde. at Chelsea.	... ...
16	S	... ...	do do	... ...
17	**S**	... ...	... ...	... ...
18	M	... ...	... ...	... ...
19	T	... ...	... ...	... ...
20	W	... ...	R.A. *v.* Harleq'ins at W'lwich	... ...
21	Th	... ...	do do	... ...
22	F	... ...	R.A. *v.* R.E. at Woolwich.	... ...
23	S	5th Dn. arrives at Wn. Forts.	do do	... ...
24	**S**	... ...	... ...	... ...
25	M	... ...	... ...	... ...
26	T	... ...	Goodwood begins.	... ...
27	W	... ...	... ...	... ...
28	Th	... ...	... ...	... ...
29	F	... ...	R.A. *v.* F.F. at Woolwich.	... ...
30	S	... ...	do do	... ...
31	**S**	... ...	... ...	...

Wn=Western.

PRÉCIS

AND

TRANSLATION.

REVUE D' ARTILLERIE.

NOTES ON INDURITE.

BY

F. E. B. L.

THIS is a smokeless powder in use in the United States Navy, of which the inventor, Mr. Charles E. Munroe, gave the following account to the Chemical Society of Washington.

His object was, he said, to produce a powder composed of one single substance chemically pure. For that purpose he began by purifying dry gun cotton by treating it with methylated spirit and by drying the residue of insoluble cellulose nitrate. The cellulose strongly azotized was then mixed with a certain quantity of mononitrobenzene,* which altered neither its appearance nor its explosive qualities. This was put into a compressor where it was agglutinated and transformed into a dark and translucid mass like india-rubber. This substance was cut up into flat strips or into grains, and compressed anew to the required dimensions, then again cut up into grains. The explosive in this state was plunged into boiling water at atmospheric pressure for the purpose of driving out the nitrobenzene and of hardening the cellulose nitrate. The mass then acquired a yellowish colour with the density and hardness of ivory.

It was this change of chemical state that modified the substance so as to transform it from a violent explosive into a slow combustion powder.

Trials made with it appear to have given very satisfactory results, notably in point of regularity. The conditions imposed by the United States Navy Board were the following :—For a velocity of 600 *metres* a pressure of 23 to 25 kg. per mm^2 (a velocity of 1970 feet and a pressure of 14½ to 16 tons per square inch).

In the result a Q.F. gun of 15^{cm} (6 in.) with a charge of 12 kg. (26 lbs.) and a shell of 45 kg. (100 lbs.) obtained muzzle velocities of 752 and 748 *metres* (2467 and 2454 feet) with pressures of 21·64 and 21·59 kg. per mm^2 (13·74 and 13·71 tons per square inch).

Indurite keeps well. A sample of it kept for 6 months in a magazine at high temperature retained its explosive property without any modification.

---

* Mononitrobenzene (or benzol) is described in Cundill's Dictionary of Explosives as consisting of 9 to 18 parts of nitrobenzol with 10 parts of gun cotton.

The form "benzene" is said to be displacing the form "benzol." In commerce they say benzine, the name altered by Liebig to benzol.

NOTES
FROM
CORRESPONDING MEMBERS.

List of additions to the Library during the month of May, 1898.

PRESENTED.	BY WHOM.
Regulations for the clothing of the Regular Army, 1898	Secretary of State.
The Military Forces of Spain, corrected up to April, 1898	
Regulations for Mobilization, 1898	
Sketch Map of the West Indian Islands and the adjoining coast of America, I.D.W.O., No. 1334. 2 Copies	Director of Military Intelligence.
Plan of the Harbour, Town and Island of St. Juan de Porto-Rico, 1797, I.D.W.O., No. 1338...	
Examination of Volunteer Artillery, May, 1898. Papers A to O	Director General of Military Education.
Message from the President of the United States, transmitting the report of the Naval court of inquiry upon the destruction of the U.S. Battle Ship "Maine" in Havana Harbour, February 15th, 1898; together with the testimony taken before the court	United States Government.
Minutes of Proceedings of the Institution of Civil Engineers. Vol. CXXXI. 1897–8. Part I.	The Council.
The Journal of the Iron and Steel Institute, Index. Vols. I. to IV., 1869–1896 ...	
The Portfolio No. 33, July 1897, "Armour in England"; by J. Starkie Gardner, Esq.	The Author.
The Rifle Brigade Chronicle, 1897... ...	Lt.-Col. Willoughby Verner.
Tactique de la guerre de siége. Attaque et Défense des Forteresses, with atlas; par V. Deguise. Bruxelles, 1898	The Editor, United Service Gazette

PURCHASED.

Bicycles and Tricycles: An elementary treatise on their design and construction; by A, Sharp.
Battles of the Nineteenth Century. London 1892. 2 Vols.
Submarine Telegraphs; their history, construction and working; by Charles Bright, F.R.S.E.
Biologia Centrali-Americana Zoology. Part CXLI.
MSS. of Artillery Drawings, Circa about 1780. 1 Vol.
The Hakluyt Society's publications: "A Journal of the first voyage of Vasco da Gama, 1497–99.
Kriegsgeschichtliche Einzelschriften. Part XXIV.

THE following works are now on sale at the R.A. Institution and will be forarded post free at the prices noted after their titles below:—

"Twenty-four hours of Moltke's Strategy" by Fritz Hoenig. Translated by Colonel N. L. Walford price 5s.

"The Shrapnel Fire of the Field Artillery" by Major-General Rohne. Translated by Colonel N. L. Walford, price 2s. 6d.

Major-General Stubbs's "List of Officers of the Bengal Artillery," price 5s. 3d.

"Field Artillery Fire," by Captain W. L. White, R.A., price 1s. 2d.

"Ranging Note-Book," by Captain S. W. Lane, R.A., price 1s. 1d.

"Achievements of Field Artillery," by Major E. S. May, R.A., bound, price 2s. 6d.

"The Value of Mobility for Field Artillery," by Major E. S. May, R.A., paper covers, price 3d.

"The Young Officer's 'Don't,' or Hints to Youngsters on Joining," by an Officer R.A., price 7d.

Examination questions in (*c*), (*d*), (*e*) and (*g*) set in the five examinations ending November 1897:—

Captains (*c*), (*d*) and (*g*) ... price 1s. 1d.
Lieutenants (*c*), (*d*), (*e*) and (*g*) price 1s. 1d.

Tables of Four-Figure Logarithms, pocket edition, mounted on linen, price 3d.

"Notes on the early history of the Royal Regiment of Artillery," by the late Colonel Cleaveland, R.A., price 2s.

"Ballistic Tables with an explanation," by A. G. Hadock, late R.A., price 5s. each, subject to a large discount to members of the R.A.I.

NOTE ON

The Services of Colonel Jonas Watson, 1st Lieut.-Col. R.A.

—BY—

LIEUT.-COLONEL H. W. L. HIME.

THERE is a tradition that when the authorities called upon Colonel Watson to give the name of the best artillery officer he knew, for appointment to the command of the artillery of the expeditionary force sent to Carthagena (New Granada) at the end of 1740, he gave his own name. However this may be, he was appointed C.R.A., although he was 78 years of age. This fact was not overlooked by the writer of the scurrilous "Account of the Expedition to Carthagena," London, 1743, who sneers at the uselessness of the 'poor gentleman' who was 'in his grand climaterick.' But the author of the sound and reliable "Journal of the Expedition to Cathagena," London, 1744, shows that this imputation was as groundless as many other scandalous charges made by this anonymous libeller. "Colonel Watson's merit and long service very justly entitled him to the command of the Train, . . nor did his age ever prevent his attendance on duty, in the performance of which he lost his life by a shot which glanced from a tree at some distance from the Battery" (p. 56). The shot broke his thigh (*Gentleman's Magazine*, 1741. p. 268), and he died in April, 1741.

BENGAL.

A FOOTBALL tournament under Association rules has this year been started in the Bengal Command. It is open to all batteries of horse, field, and mountain artillery, and companies of garrison artillery quartered in that command. The initial results may be considered as satisfactory. Twenty-one batteries or companies have joined the Association and eighteen of these entered teams to compete for the challenge cup. This cup is a full-sized model in silver of an Association football. The winners of the tournament to hold it for the year and to get a money prize of Rs. 100. The 70th Field Battery, quartered at Bareilly, are the holders for 1898.

Subjoined is a full return of the ties, and from the results it will be seen there were some very keenly contested games.

1st TIES.

“C” Battery, R.H.A. beat 15th Field Battery, R.A.	Meerut.	4 goals to love.
“N” Battery, R.H.A., beat 54th Field Battery, R.A.	Meerut.	1 goal to love.
9th Co., So. Divn., R.A., beat 4th Co., Wn. Div., R.A.	Roorkee.	2 goals to love.
9th Co., Wn. Divn., R.A., beat 80th Field Bty., R.A.	Jhansi.	
41st Field Bty., R.A., beat “B” Battery, R.H.A.	Lucknow.	7 goals to 3

Byes:—6th, 30th, 48th, 59th, 70th Field Batteries, R.A., 5th, 11th Co's, So. Divn., 9th Co., Eastn. Divn., R.A.

2nd TIES.

“C” Battery, R.H.A., beat “N” Battery, R.H.A.	Meerut.	1 goal to love. after extra time.
9th Co., So. Divn., R.A., beat 11th Co., So. Div., R.A.	Roorkee.	5 goals to love.
59th Field Battery, R.A., beat 9th Co., Wn. Div., R.A.	Nowgong.	2 goals to love.
70th Field Battery, R.A., beat 30th Field Battery, R.A.	Lucknow.	3 goals to love, after a draw 1 goal each.
9th Co., En. Div., R.A., beat 6th Field Bty., R.A.	Dinapore.	2 goals to love after a draw.

Byes:—41st, 48th, Field Batteries, R.A., 5th Co., So. Divn., R.A.

3rd TIES.

“C” Battery, R.H.A., beat 9 Co., So. Divn., R.A.	Meerut.	2 goals to love.
5th Co. So. Divn, R.A., beat 59th Field Bty., R.A.	Agra.	2 goals to 1.
9th Co., En. Divn., R.A., beat 48th Field Bty., R.A.	Allahabad.	1 goal to love.
70th Field Bty., R.A., beat 41st Field Bty., R.A.	Bareilly.	1 goal to love.

4th. TIES.

70th Field Bty., R.A., beat 5th Co., So. Div., R.A.	Meerut.	2 goals to love.
“C” Battery, R.H.A., beat 9th Co., East. Div., R.A.	Meerut.	1 goal to love.

FINAL.

70th Field Bty., R.A., beat “C” Battery, R.H.A.	Meerut.	2 goals to 1.

Obituary.

COLONEL SIR V. D. MAJENDIE, K.C.B. (retired) died suddenly at Oxford on 24th April, 1898. He joined the Regiment as 2nd Lieutenant, 23rd October, 1854; became Lieutenant, 13th December, 1854; 2nd Captain, 1st April, 1861; Captain, 28th September, 1871; Major, 5th July, 1872; Lieut.-Colonel, 13th February, 1881 and retired with the hon. rank of Colonel, 1st October, 1881.

Sir Vivian Majendie served during the Crimean Campaign, 1855, and was present at the siege and fall of Sebastopol (medal with clasp and Turkish medal); Indian Mutiny, 1858; siege and capture of Lucknow, and action of Sirsee (medal with clasp). He was Captain Instructor of the Royal Laboratory from October, 1861 to January, 1866, and Assistant-Superintendent Royal Laboratory from February, 1866, to July, 1871, when he was appointed H. M. Inspector of Explosives, and at the time of his death he was Chief Inspector. Besides various reports which he published in his official capacity Sir Vivian was the author of a work called "Up among the Pandies"; this gives an excellent account of what he saw of the Mutiny. Sir Vivian devoted much of his spare time to the welfare of the boys of St. Paul's Cathedral Choir School and at his funeral the services both in the Cathedral and at the grave in Charlton Cemetery were chorally rendered by the full Cathedral choir.

LIEUTENANT A. F. PORCHER, whose death occurred at Lagos on 20th April, 1898, was first commissioned as 2nd Lieutenant, 1st April 1892, and became Lieutenant 1st April, 1895.

DIARY OF FIXTURES.

JUNE.

Day of the		Regimental.	Cricket, &c.	Private.
Mth	Wk.			
1	W	... ...	... ...	... ...
2	Th	... ...	... ...	... ...
3	F	Annual General Meeting R.A.I. at R.U.S.I. Whitehall 3 p.m.	REGIMENTAL R.A. *v.* Eton Ramblers at Woolwich.	DINNER ... ...
4	S	3rd Dn. arrives at Wn. Forts. 6th Dn. (F.A. 1st Bde. Dn. Woolwich) arr. Shoeb'yness	do do	... ...
5	S	... ...	... ...	... ...
6	M	... ...	... ...	... ...
7	T	... ...	... ...	... ...
8	W	... ...	... ...	... ...
9	Th	... ...		... ...
10	F	... ...	R.A. *v.* Butterflies at W'lwich	... ...
11	S	7th Dn. (F.A. Colchester) arrives at Shoeburyness.	do do	... ...
12	S	... ...	... ...	... ...
13	M	... ...	... ...	... ...
14	T	... ...	Ascot begins	... ...
15	W	... ...	... ...	... ...
16	Th	... ...	... ...	... ...
17	F	... ...	R.A. *v.* R.E. at Chatham.	... ...
18	S	3rd Dn. (R.H.A. mixed) arrives at Okehampton. 8th Dn. (F.A. Weedon) arrives at Shoeburyness.	do do	... ...
19	S	... ...	... ...	... ...
20	M	... ...	R.A. *v.* M.C.C. at Lord's.	... ...
21	T	3rd Dn. (F A. Athlone) arrives at Glenbeigh.	do do	... ...
22	W	... ...	R.A. *v.* Yorkshire Gentlemen at Woolwich.	... ...
23	Th	... ...	do do	... ...
24	F	... ...	... ...	... ...
25	S	... ...	... ...	... ...
26	S	... ...	... ...	... ...
27	M	... ...	... ...	... ...
28	T	Officers' Short Course at Okehampton begins.	Newmarket 1st July Meeting begins.	... ...
29	W	... ...	... ...	... ...
30	Th	... ..	Oxford *v.* Cambridge begins	... ...

Wn = Western.

JULY.

Day of the				
Mth.	Wk.	Regimental.	Cricket, &c.	Private.
1	F	2nd Dn. Siege arrives at Lydd	... ...	... ...
2	S	4th Dn. arrives at Wn. Forts.	... ...	... ...
3	**S**	... ...	... ...	... ...
4	M	... ...	... ...	... ...
5	T	... ...	... ...	... ...
6	W	... ...	... ...	... ...
7	Th	... ...	... ...	... ...
8	F	... ...	Eton *v.* Harrow. R.A. *v.* B.B. Woolwich.	... ...
9	S	... ...	do do	... ...
10	**S**	... ...	... ...	... ...
11	M	... ...	... ...	... ...
12	T	... ...	Newmarket 2nd July Meeting begins.	... ...
13	W	4th Dn. (F.A. Exeter) arrives at Okehampton.	... ...	... ...
14	Th	... ...	... ...	... ...
15	F	... ...	R.A. *v.* Household Bde. at Chelsea.	... ...
16	S	... ...	do do	... ...
17	**S**	... ...	... ...	... ...
18	M	... ...	... ...	... ...
19	T	... ...	... ...	... ...
20	W	... ...	R.A. *v.* Harleq'ins at W'lwich	... ...
21	Th	... ...	do do	... ...
22	F	... ...	R.A. *v.* R.E. at Woolwich.	... ...
23	S	5th Dn. arrives at Wn. Forts.	do do	... ...
24	**S**	... ...	... ...	... ...
25	M	... ...	... ...	... ...
26	T	... ...	Goodwood begins.	... ...
27	W	... ...	... ...	... ...
28	Th	... ...	... ...	... ...
29	F	... ...	R.A. *v.* F.F. at Woolwich.	... ...
30	S	... ...	do do	... ...
31	**S**	... ...	... ...	... ...

Wn = Western.

AUGUST.

Day of the				
Mth	Wk.	Regimental.	Cricket, &c.	Private.
1	M	Bank Holiday.	RA *v.* Authentics at W'lwich	... ...
2	T	... ...	do do	... ...
3	W	... ...	R.A. *v.* I.Z. at Woolwich.	... ...
4	Th	... ...	do do	... ...
5	F	... ...	... ...	... ...
6	S	... ...	... ...	... ...
7	**S**	... ...	... ...	... ...
8	M	... ...	... ...	... ...
9	T	... ...	... ...	... ...
10	W	... ...	... ...	... ...
11	Th	... ...	... ...	... ...
12	F	... ...	.. ...	... ...
13	S	6th Dn. arrives at Wn. Forts.	... ...	... ...
14	**S**	... ...	... ...	... ...
15	M	... ...	... ...	... ...
16	T	... ...	... ...	... ...
17	W	... ...	... ...	... ...
18	Th	... ...	... ...	... ...
19	F	... ...	... ...	... ...
20	S	... ...	... ...	... ...
21	**S**	... ...	... ...	... ...
22	M	... ...	... ...	... ...
23	T	6th Dn. (F.A. Hilsea) arrives at Okehampton.	... ...	... ...
24	W	Officers' Short Course at Okehampton begins.	... ...	... ...
25	Th	... ...	... ...	... ...
26	F	... ...	... ...	... ...
27	S	... ...	... ..	... ...
28	**S**	... ...	... ...	... ...
29	M	... ...	... ...	... ...
30	T	... ...	... ...	... ...
31	W	... ...	... ...	... ...

Wn=Western.

NOTES

FROM

CORRESPONDING MEMBERS.

"DUNCAN" GOLD MEDAL PRIZE ESSAY, 1899.

THE Subject approved for the "Duncan" Gold Medal Prize Essay, 1899, is as follows:—

"The technical training of officers in Garrison Artillery."

The Rules for the Prize Essays now read:—

The Annual Gold Medal, when awarded, to be accompanied by an *honorarium* of £20; the Silver Medal by an *honorarium* of £10.

The candidates must be Officers of the Regiment who are members of the R.A. Institution.

Officers are requested to confine their Essays to about 16 printed pages of the "Proceedings" other things being equal, brevity will count towards success.

The Essays must be forwarded to the Secretary so as to reach him on or before the 1st of April.

Each Essay must be *type-written* in triplicate. The Essays must be strictly anonymous, but each to have a motto, and be accompanied by a sealed envelope with the motto written outside and the name of the writer inside; further, if the writer wishes to recover from the Committee part of the cost of type-writing his Essay he should state this fact in the same sealed envelope and write outside it, above the motto, "to be opened."

All the envelopes thus marked will be opened by the Secretary after the result of the competition has been announced, and he will send the writers the money for their type-writing expenses.

The Committee will allow a sum of £1 for type-writing each Essay.

The Essays will be submitted for decision to three Judges chosen by the Committee.

The Judges are empowered to recommend:—

1. That two Medals, one Gold and one Silver, be awarded, or
2. That only one Medal, Gold or Silver, according to the merit of the Essay, be awarded, or
3. That no Medal be awarded.

The names of the successful candidates will be announced at the Annual Meeting, and Medallists will be distinguished as such in all Lists, &c., issued from the Institution; and in the event of a University man gaining a Medal, a report of his success will be made to the University of which he may be a member.

The successful Essays will be printed and circulated to members by the Institution.

N.B.—The Committee draw particular attention to the paragraph in the Rules above on the subject of length of Essays; it is not difficult to discover the number of words in an average page of "Proceedings" matter, and so to keep an Essay within the 16 pages' limit.

List of additions to the Library during the month of June, 1898.

PRESENTED.	BY WHOM.
Plan of the Town and Harbour of Havana in the Island of Cuba. 1762.	Director of Military Intelligence.
Particulars of Rifled Guns and Howitzers, April, 1898. 6 copies.	Inspector General of Ordnance.
Surprise in War, from a Military and National point of view; by T. M. Maguire, LL.D.	The Author.
Memorandum on Quick-Firing Field Guns (land service); by Lieut.-Colonel L. K. Scott, C.B., late R.E.	do.
Smithsonian Miscellaneous Collections, No. 1087; "A catalogue of earthquakes on the Pacific Coast, 1769 to 1897". ... ... Smithsonian Annual Report. 1895.... ...	Smithsonian Institution.
Greenwich Magnetical and Meteorological Observations. 1895........................ Report of the Astronomer Royal to the Board of Visitors of the Royal Observatory, Greenwich. 1897-8.	Astronomer Royal.
Water Color Painting in Gilt Frame: "Fortress of Bidar, Deccan, India:—The Triple Ditch".	Major. B. Burton, R.H.A.

PURCHASED.

The Navy Records Society's publication "The Spanish War 1585–87".
The Naval Pocket Book. 1898.
Schlachten-Atlas. Part LV.
Brassey's Naval Annual. 1898.

THE following works are now on sale at the R.A. Institution and will be forwarded post free at the prices noted after their titles below:—

"Twenty-four hours of Moltke's Strategy" by Fritz Hoenig. Translated by Colonel N. L. Walford, price 5s.

"The Shrapnel Fire of the Field Artillery" by Major-General Rohne. Translated by Colonel N. L. Walford, price 2s. 6d.

Major-General Stubbs's "List of Officers of the Bengal Artillery," price 5s. 3d.

"Field Artillery Fire," by Captain W. L. White, R.A., price 1s. 2d.

"Ranging Note-Book," by Captain S. W. Lane, R.A., price 1s. 1d.

"Achievements of Field Artillery," by Major E. S. May, R.A., bound, price 2s. 6d.

"The Value of Mobility for Field Artillery," by Major E. S. May, R.A., paper covers, price 3d.

" The Young Officer's 'Don't,' or Hints to Youngsters on Joining," by an Officer R.A., price 7d.

Examination questions in (*c*), (*d*), (*e*) and (*g*) set in the five examinations ending November 1897 :—

Captains (*c*), (*d*) and (*g*) ... price 1s. 1d.
Lieutenants (*c*), (*d*), (*e*) and (*g*) price 1s. 1d.

Tables of Four-Figure Logarithms, pocket edition, mounted on linen, price 3d.

" Notes on the early history of the Royal Regiment of Artillery," by the late Colonel Cleaveland, R.A., price 2s.

" Ballistic Tables with an explanation," by A. G. Hadcock, late R.A., price 5s. each, subject to a large discount to members of the R.A.I.

R.A. Games' Fund.

THIS fund was considered after the Annual General Meeting, R.A.I. on 3rd June, 1898; the Committee report as follows :—

The accounts presented are those to 31st May, 1898.

The numbers of subscribers to the Fund, May, 1897=1,054.
„ „ „ „ „ 1898=1,130.

This year the racket and billiard matches were played at Chatham and resulted in the Regiment retaining possession of both cups.

The Royal Engineers have again won the golf matches which were played as before over the St. George's Club links at Sandwich.

The grants to stations are much the same as usual; the refunds of grants shown on the 'Receipts' side bear witness to the careful manner in which the conditions laid down by the Committee when making grants are complied with.

The Committee granted assistance to a pair entering for the Army Racket Challenge Cup at Prince's Club; the expenses connected with practice at Prince's are very heavy; though the Regimental pair failed to beat the holders they won every other tie; the Committee fear that owing to the conditions of the competition it will be a long time before the Royal Artillery is able to enter so strong a pair; they have no intention of granting assistance to any pair not likely to do credit to the Regiment.

The Committee have recently decided to assist, by payment of travelling expenses, such officers as may be selected to represent the Regiment in either or both of the annual cricket matches against the Royal Engineers.

Major S. B. von Donop, R.A., has for some months been noting the working of the Fund with a view to taking over the Secretaryship vacated by Major Abdy leaving the R.A.I.

The Committee consists of Major-General F. T. Lloyd, C.B.
Colonel J. F. Bally, R.A.
Major W. F. Lindsay, R.A.
Major A. J. Abdy, R.A., *Hon. Secretary.*

The Report was adopted and the Accounts as given herewith were passed.

Permission was given to the Committee to make such a grant as they think fit to the Officers R.A. at Shoeburyness, towards the expenses of rebuilding the boathouse at that Station which was destroyed by fire last winter.

Accounts.

EXPENDITURE.

	£	s.	d.	£	s.	d.
Grants—R.A. Guernsey, Yacht	15	0	0			
" R.A. Golden Hill, Stiké Court...	25	0	0			
" R.A. Singapore, Lawn Tennis Courts...	20	0	0			
" R.A. Rangoon, Sailing Boat ...	20	0	0			
" R.A. Bermuda boat at Ireland I.	10	0	0			
" R.A. Bermuda, Stiké Court, St. Georges	25	0	0			
" R.A. Dover, Officers' Cricket Pavilion	60	0	0			
" R.A. Aldershot, S. Camp 2nd grant Croquet and Tennis Lawns	25	0	0			
				200	0	0
Expenses Racket and Billiard Matches Officers.						
"	8	0	0			
"	2	5	8			
"	3	18	11			
"	6	1	2			
				20	5	9
Expenses Army Racket Cup.	...		...	20	0	0
" Racket and Billiard Matches.	3	9	2			
" " "	0	18	8			
" " "	0	10	0			
" " "	1	0	0			
" " "	1	0	0			
				6	17	10
Expenses Golf Trials and Matches Officers.						
"	4	4	6			
"	4	11	4			
"	1	9	7			
"	3	5	3			
"	6	0	0			
"	1	3	0			
"	8	0	0			
"	3	19	6			
"	3	0	0			
"	3	8	2			
"	3	10	4			
				42	11	8
Clerk making out Annual Lists				1	0	0
Subscriptions refunded				1	1	0
Charge on Scotch Cheque				0	0	6
Postage				0	14	4
Balance in hands of Hon. Sec.				4	14	1
Balance at Messrs. Cox & Co.				218	8	1
Total				515	13	3

RECEIPTS.

	£	s.	d.	£	s.	d.
Credit brought forward				166	0	5
Cox & Co. credited by	1	9	0			
" "	8	15	0			
" "	1	18	0			
" "	2	5	0			
" "	16	18	0			
" "	24	7	6			
" "	20	11	0			
" "	207	6	0			
				283	9	6
Grants refunded Limerick	1	0	0			
" " Dover	10	0	0			
" " "	18	0	0			
" " Leith Fort	23	0	0			
				52	0	0
Subscriptions received direct ...	1	0	0			
	0	5	0			
	1	0	0			
				2	5	0
Dividends, July	2	19	7			
" Oct.	2	19	7			
" Jan.	2	19	7			
" April	2	19	7			
				11	18	4
Total				515	13	3

NOTE.—The fund possesses £283 16*s.* 3*d.* 2½°/₀ Consols, and £174 16*s.* 5*d.* 3°/₀ Local Loans Stock.

Woolwich
May 31st, 1898.

A. J. ABDY, Major,
Hon. Secretary R.A. Games'

NOTES

FROM

CORRESPONDING MEMBERS.

"DUNCAN" GOLD MEDAL PRIZE ESSAY, 1899.

THE Subject approved for the "Duncan" Gold Medal Prize Essay, 1899, is as follows:—

"The technical training of officers in Garrison Artillery."

The Rules for the Prize Essays now read:—

The Annual Gold Medal, when awarded, to be accompanied by an ***honorarium*** of £20; the Silver Medal by an *honorarium* of £10.

The candidates must be Officers of the Regiment who are members of the R.A. Institution.

Officers are requested to confine their Essays to about 16 printed pages of the "Proceedings" other things being equal, brevity will count towards success.

The Essays must be forwarded to the Secretary so as to reach him on or before the 1st of April.

Each Essay must be *type-written* in triplicate. The Essays must be strictly anonymous, but each to have a motto, and be accompanied by a sealed envelope with the motto written outside and the name of the writer inside; further, if the writer wishes to recover from the Committee part of the cost of type-writing his Essay he should state this fact in the same sealed envelope and write outside it, above the motto, "to be opened."

All the envelopes thus marked will be opened by the Secretary after the result of the competition has been announced, and he will send the writers the money for their type-writing expenses.

The Committee will allow a sum of £1 for type-writing each Essay.

The Essays will be submitted for decision to three Judges chosen by the Committee.

The Judges are empowered to recommend:—

1. That two Medals, one Gold and one Silver, be awarded, or
2. That only one Medal, Gold or Silver, according to the merit of the Essay, be awarded, or
3. That no Medal be awarded.

The names of the successful candidates will be announced at the Annual Meeting, and Medallists will be distinguished as such in all Lists, &c., issued from the Institution; and in the event of a University man gaining a Medal, a report of his success will be made to the University of which he may be a member.

The successful Essays will be printed and circulated to members by the Institution.

N.B.—The Committee draw particular attention to the paragraph in the Rules above on the subject of length of Essays; it is not difficult to discover the number of words in an average page of "Proceedings" matter, and so to keep an Essay within the 16 pages' limit.

THE following works are now on sale at the R.A. Institution and will be forwarded post free at the prices noted after their titles below:—

"Twenty-four hours of Moltke's Strategy" by Fritz Hoenig. Translated by Colonel N. L. Walford, price 5s.

"The Shrapnel Fire of the Field Artillery" by Major-General Rohne. Translated by Colonel N. L. Walford, price 2s. 6d.

Major-General Stubbs's "List of Officers of the Bengal Artillery," price 5s. 3d.

"Field Artillery Fire," by Captain W. L. White, R.A., price 1s. 2d.

"Ranging Note-Book," by Captain S. W. Lane, R.A., price 1s. 1d.

"Achievements of Field Artillery," by Major E. S. May, R.A., bound, price 2s. 6d.

"The Value of Mobility for Field Artillery," by Major E. S. May, R.A., paper covers, price 3d.

"The Young Officer's 'Don't,' or Hints to Youngsters on Joining," by an Officer R.A., price 7d.

Examination questions in (*c*), (*d*), (*e*) and (*g*) set in the five examinations ending November 1897:—

Captains (*c*), (*d*) and (*g*) ... price 1s. 1d.
Lieutenants (*c*), (*d*), (*e*) and (*g*) price 1s. 1d.

Tables of Four-Figure Logarithms, pocket edition, mounted on linen, price 3d.

"Notes on the early history of the Royal Regiment of Artillery," by the late Colonel Cleaveland, R.A., price 2s.

"Ballistic Tables with an explanation," by A. G. Hadcock, late R.A., price 5s. each, subject to a large discount to members of the R.A.I.

Hamilton Memorial Fund.

The Committee of the Hamilton Memorial Fund desire to inform subscribers that the centre window on the north side of the nave of the Garrison Chapel at Shoeburyness, has been filled in to the memory of the late Major Peter Fisher Percival Hamilton, R.A.

"The History of Landguard Fort."

"THE History of Landguard Fort, in Suffolk," by Major J. H. Leslie, late Royal Artillery, of which an advance notice was printed in these notes for April of the current year, has now been published by Messrs. Eyre and Spottiswoode. Major Leslie has evidently taken the greatest trouble with his subject and the result is a book which does him the highest credit and is altogether worthy of a fort that has played so great a part in the history of England. It is admirably illustrated and authorities for each statement are carefully quoted by the author.

A work of this sort cannot fail to arouse the interest of officers of the Regiment serving in or near other forts of great historic interest, such as Southsea Castle and Leith Fort; and it is to be hoped that some will be found ready to follow Major Leslie's excellent lead. The book should be in the possession of every regimental Mess and Library.

Records of No. 3 Mountain Battery, R.A.

THE records of No. 3 Mountain Battery, Royal Artillery, printed at the 'Pioneer' Press, Allahabad, have just been received from India. They are of peculiar interest as besides a brief notice of the Battery's service in the American War of Independence, the West India Islands, the Peninsula, Holland and Belgium, they give a very full account of the series of mountain fights in which the battery has had the good fortune to be engaged since it was specially selected to take over mountain equipment towards the end of 1879.

They were the first to receive the 'jointed or screw guns,' this was early in 1880 and since then 'they have used none other.' With them they have served in the field; 1880 in Afghanistan; 1884 Zhob Valley; 1886–87 Burma; 1888 Sikkim; 1891 Miranzai; 1892 Isazai; 1895 Chitral Relief; 1897 Mohmand Field Force; 1897–98 Tirah Field Force.

The records give clear and concise accounts of each action in which the battery took part and the names of each officer and staff N.C.O. present with it on any occasion of interest are set forth at length.

It is a good specimen of what a battery's records should be.

A lovely day towards the end of June; a hearty welcome and the noble hospitality of the 'Rag' extended to each one able to come from Woolwich. Soon a move is made, a flying journey through fields of strawberries and fresh cut hay and past "The Home of flowers' and 'ere we have time to tire a drive through broadly rolling hills lands us, though far from sight or sound of war, beside a battery of guns.

What can this mean?—simply that the firm of Vickers Sons and Maxim, Limited, are entertaining a large party, including many officers of the Regiment, to view firing with their newest Q.F. field guns.

Their proof range, situated less than 20 miles from town, is close to some of Kent's loveliest scenery:—here surrounded by haymakers the roar of 12½-prs. and sharper crack of 37 mm. gun, sound somewhat out of place. But, after time to look round how familiar it all is—here, a small detachment of five neatly uniformed numbers contains an old friend in an ex-sergeant-major of the 'Shop'; there, on the paulins laid out by classes are the rounds ready for firing; close by, the familiar whirr of the telephone bell and question 'Is the range clear?' recall old days at Lydd or Shoebury.

Then, as the range is blocked, each gun and all its parts are clearly shown by one, though of the sister service, well known to many, through years of duty in the Arsenal.

And now the range is clear, shot after shot, burst after burst are watched, reported and noted with all the care and regularity of the Arsenal Butts. Then come rounds for speed—five in less than 24 seconds—all bursting regularly, no need to run up or do more than open, close the breech and pull the lanyard. Next a move is made to the little mountain gun, from which a shell of 20 lbs. is fired, after some rounds of 13½ lbs., burst with the Krupp fuze; of these last the range report comes back '18,' '18,' '20,' '19 short'.

One of us, just back from Egypt, tells how the work of running up and revolving the wheels so as to engage the check ropes of even this small gun soon became trying to the detachments, so heavy was the artillery fire at the Atbara River. Lastly, rounds are fired from the 37 mm. machine gun—1 lb. shots poured in a constant stream as if mere ·303.

Then a hurried drive, another journey back to town and parting thanks mixed with thoughts that after all England is not so very wrong; delay she may in choice of new equipments, but when this delay means improvement on what other countries have adopted and careful guard against their errors, the result seems generally to be in her favour.

In the case of Q.F. field guns it may safely be said that, if the trials now proceeding bring to light a gun and ammunition capable of surpassing those here described and our batteries be equipped with them, no foreign nation can hope to compete in materiel with the Royal Artillery.

BOMBAY.

THOUGH somewhat belated the following notes on the winter of 1897-8 may still be of interest if indeed that season can be said to prevail in the city

> " Between the Palms and the Sea "
> " Where the world end steamers wait."

and where the beautiful tropical foliage is as luxuriant in December as in June; the thermometer never falls below 70°, fires are unknown, houses are kept open day and night all the year round, punkahs never cease to swing and Her Majesty's troops wear white or khaki uniform in mid-winter. To those who have not been in India for some years the prevalence of khaki in place of white cannot fail to arouse attention as well as other changes in dress such as soldiers walking out in the most frequented parts of the town in field service forage caps without sticks or gloves. Officers wearing white stick-up collars in one of the stickiest climates in the world; lace boots, jack spurs and blue putties for mounted officers, etc. It is strange that the Royal Navy with its reputation for all that is serviceable should never have adopted khaki but it would undoubtedly cause a shock to see a blue-jacket so equipped for the first time instead of his usual snow-white jumper and ducks with straw hat or cloth cap with white cover.

The naval harbour defences of Bombay have been so increased of late years that it may be of interest to mention of what they now consist, first stating that the Commodore is Captain H. L. Fleet, R.N., so well known to so many military officers as the popular No. 1 of H.M.S. '*Serapis*' in the old trooping days. His present flotilla comprises the coast defence turret ships '*Magdala*' and '*Abyssinia*,' the torpedo gunboats '*Plassy*' and '*Assaye*,' and seven first class torpedo boats. Very smart and serviceable they all look painted white and riding on the bright blue waters of the harbour opposite the Apollo Bunder. The total complement of crews is 600 men all of whom, excepting one man per vessel, are berthed on board the Indian marine hulk '*Tenassarim*,' on which Captain Fleet lives and flies his flag and where the ward room mess is found.

Kipling speaks of the " world-end steamers " and certainly it is characteristic of Bombay that everyone who leaves India and everyone who arrives in India passes through Bombay so that what with the hired transports and the P. & O. mail steamers, officers stationed there have many opportunities of meeting old friends, and happy reunions and pleasant parties at the yacht club mark the winter months.

The Bubonic Plague, always worst in the cold weather, has undoubtedly been a great and undesirable feature in the life at Bombay during the past two years. The total deaths up to date amount to 26,000 out of a population of 900,000. Fortunately, last winter they succeeded in keeping it out of Colaba the only case being a barber, who, although he actually shaved one or two officers with the plague on him did not communicate the infection—a rather lucky stroke if it is remembered the unpleasant habit native barbers have of stropping their razor on the palm of their hand after every stroke. Several R.A. Officers were employed on plague duty—Captain Mostyn, Lieutenant Carey, and 2nd Lieutenant Lough, and in return for the disagreeable work they had to do received pretty liberal extra pay. The culminating point of the plague of 1897-8 may be said to be the riots of 11th March in which two soldiers of the Shropshire Regiment were beaten to death and during which the R.A. from Colaba manned two 9-pr. guns near the Grant Road Hospital, and two more at Jacob's Circle the men being kept on duty there for an entire week.

Undoubtedly, however, the great event of the year and one that will long be remembered was the total eclipse of the sun of the 22nd January. Rarely is it given to such numbers of persons to witness this marvellous phenomenon under the most perfect atmospheric conditions and with so little trouble and expense. The line of totality passed diagonally through the Indian Peninsula roughly from N.E. to S.W., and the most accessible point on that line was a small place about half way between Poona and Sholapur called Jeur to which numerous special trains were run from Bombay, Madras and other parts of India. The Railway Company was quite equal to the occasion and had an enormous tent pitched by the line with luncheon and dinner for 600 covers at a time and other conveniences. Some of the R.A. officers were fortunate enough to get taken on as Assistant Observers in some of the scientific expeditions which had been sent to India to witness the Eclipse while others, (amongst whom was Major Callwell), joined Mr. Justice Parson's 1st class special excursion train. Major Boileau was attached to the camp of Professor Campbell from the Lick Observatory, California, while Major Harkness and Captain Duhan were with Professor Burkhatter's expedition from another part of America.

The strength of the R.A. at Colaba was temporarily increased during the drill season by No. 8 Eastern from Delhi and No. 5 Southern from Agra ordered to Bombay for a three months' course of instruction in Coast defence, but as No. 5 Southern were encamped at Mahaluxmi not so much was seen of them, (except on racing days,) as of No. 8 Eastern which were under canvas at Colaba.

Several changes took place during the relief season amongst the garrison companies, No. 3 Eastern proceeded to Rangoon and were relieved by No. 18 Western from the same place. No. 28 Southern from Quetta and No. 23 Southern from Colaba changed stations, the latter being played out on 12th February by the band of the Shropshire Light Infantry—old Woolwich friends of their majors.

During the last six months Major Callwell has been commanding the R.A. at Bombay and Lieut.-Colonel Stevens the R.A. in the Bombay Command from Poona, vice Brigadier-General Spragge at Tirah.

As regards sports it is regretted there is nothing to record of polo or cricket as far as the R.A. are concerned, but on the other hand yachting has never been more flourishing. The first mess yacht *Mannikin* has now been supplemented by another of the *Tomtit* class called the *Midget*, of which the following is a description :—

Dimensions.—Length over all 18 ft. Beam extreme, 7 ft. The boats are fitted with a Centre-board casing, but owners may have the option of fitting either a Centre-board or a Fin with bulb of lead or iron.

The boats are decked and the deck may not be less than ½ inch in thickness.

The boats are built of teak throughout except deck, deckbeams and floor boards.

The mast from deck to hounds may not exceed 15 feet.

The working sails may not exceed 250 square feet by Y.R.A. rule divided into mainsail and jib. No balloon jib allowed nor may the spinnaker be set as a jib.

Ballast.—No outside ballast allowed and inside not to exceed 1 cwt. Each boat must carry an anchor of not less than 20 lbs. or more than 25lbs. weight.

She cost Rs. 750 and during the past season has won three 1st, three 2nd and four 3rd prizes, the officers who generally steered her to victory being Captains Duhan, Chamier, Coxhead and Major Harkness.

The Bombay Hounds had a successful season's sport but with a very sad termination, the master, Mr. H. M. Steuart, being run over and killed by a train at the Church Gate Station. Captain Duhan, Lieutenants Keddie and Atkinson were the three who hunted most regularly.

List of additions to the Library during the month of July, 1898.

PRESENTED.	BY WHOM.
Colored Lithographs, R.C.D., 251 and 253 to 259. R.L. 252 to 255.	Secretary of State.
General report on Royal Artillery Practice, Drill and Equipment, Bombay Command, 1897-8; Part I. (Horse, Field and Mountain Artillery); Part II. (Siege and Garrison Artillery); 3 copies of each	Brigadier-General Comdg. R.A. Bombay Command.
Minutes of Proceedings of the Institution of Civil Engineers; Vol. 132, Part II.; 1897-8	The Council.
Twenty-second annual report of H.M.'s Inspectors of Explosives, 1897	Inspector of Explosives.
Parade State of Royal Military Academy, Woolwich: Diamond Jubilee Celebration, 22nd June, 1897	Asst.-Comdt. R.M. Academy.
Colored Chart, "Six centuries of attack"; by Captain B. R. Ward, R.E.	The Author.
Pamphlet, "Tactical training in time of peace"; by Major T. D. Pilcher, Northumberland Fusiliers	do
Records of No. 3 Mountain Battery R.A.	Lieut.-Col. J. D. Cunningham, R.A.

PURCHASED.

A monograph of the Turdidae, or family of Thrushes; Part III.
Dictionary of National Biography; Vol. 55.
Elementary lessons in electricity and magnetism; by Silvanus P. Thompson.
The History of Landguard Fort in Suffolk; by Major J. H. Leslie, late R.A.
Biologia Centrali-Americana—Zoology; Part 142.
Etat Militaire du corps de L'Artillerie, pour 1898
German-English Dictionary; Part 6; Vol. II.; by Professors Muret and Sanders.

Museum.

PRESENTED.	BY WHOM.
1 case containing heads, skins, native curios, etc., from South Africa...	Lieut.-Colonel Sir M. J. Clarke, K.C.M.G., late R.A.
DEPOSITED.	
1 case containing heads, skins, native curios, etc., from South Africa	

Obituary.

CAPTAIN S. J. CHAMIER died at Bombay, 14th July, 1898. He joined the Regiment as Lieut. 28th July, 1883 and became Capt. 1st April 1892.

LIEUT.-COLONEL S. GARDINER (retired), died in London on 26th June, 1898, he was first commissioned as Lieutenant, 1st November, 1860; became Captain, 16th April, 1873; Major, 1st July, 1881; Lieut.-Colonel, 29th January, 1888; and retired on retired pay, 29th January, 1893.

MAJOR-GENERAL H. L. F. GREVILLE (retired), who died in London on 5th July, 1898, he was first commissioned as 2nd Lieutenant, 19th December, 1844; became 1st Lieutenant, 1st April, 1846; 2nd Captain, 21st June, 1853; Captain, 22nd February, 1856; Brevet-Major, 5th September, 1865; Lieut.-Colonel, 6th July, 1867; Colonel, 6th July, 1872; and retired on special pension with the hon. rank of Major-General, 13th July, 1881.

LIEUT.-GENERAL E. A. WILLIAMS, C.B., Colonel Commandant, whose death occurred suddenly at Blackheath on 20th June, 1898; joined the Regiment as 2nd Lieutenant, 1st January 1842; became 1st Lieutenant, 3rd November, 1842; 2nd Captain, 1st November, 1848; Captain, 28th June, 1854; Brevet.-Major, 20th July, 1860; Lieut.-Colonel, 21st June, 1862; Colonel, 21st June, 1867; Major-General, 1st May, 1880; and retired on retired pay with the hon. rank of Lieut.-General, 1st May, 1885; promoted Colonel Commandant, 3rd September, 1890. General Williams served during the New Zealand War, 1864–66. Commanded the Royal Artillery, Waikato, Tauranga, and Wanganui campaigns; actions of Rangiawhia, Haerini, Gate Pah, and Nukumaru. Despatches, *London Gazette*, 12th April, 1865; medal and C.B.

NOTES

FROM

CORRESPONDING MEMBERS.

"DUNCAN" GOLD MEDAL PRIZE ESSAY, 1899.

THE Subject approved for the "Duncan" Gold Medal Prize Essay, 1898, is as follows:—

"The technical training of officers in Garrison Artillery."

The Rules for the Prize Essays now read:—

The Annual Gold Medal, when awarded, to be accompanied by an *honorarium* of £20; the Silver Medal by an *honorarium* of £10.

The candidates must be Officers of the Regiment who are members of the R.A. Institution.

Officers are requested to confine their Essays to about 16 printed pages of the "Proceedings" other things being equal, brevity will count towards success.

The Essays must be forwarded to the Secretary so as to reach him on or before the 1st of April

Each Essay must be *type-written* in triplicate. The Essays must be strictly anonymous, but each to have a motto, and be accompanied by a sealed envelope with the motto written outside and the name of the writer inside; further, if the writer wishes to recover from the Committee part of the cost of type-writing his Essay he should state this fact in the same sealed envelope and write outside it, above the motto, "to be opened."

All the envelopes thus marked will be opened by the Secretary after the result of the comptition has been announced, and he will send the writers the money for their type-writing expenses.

The Committee will allow a sum of £1 for type-writing each Essay.

The Essays will be submitted for decision to three Judges chosen by the Committee.

The Judges are empowered to recommend:—

1. That two Medals, one Gold and one Silver, be awarded, or
2. That only one Medal, Gold or Silver, according to the merit of the Essay, be awarded, or
3. That no Medal be awarded.

The names of the successful candidates will be announced at the Annual Meeting, and Medallists will be distinguished as such in all Lists, &c., issued from the Institution, and in the event of a University man gaining a Medal, a report of his success will be made to the University of which he may be a member.

The successful Essays will be printed and circulated to members by the Institution.

N.B.—The Committee draw particular attention to the paragraph in the Rules above on the subject of length of Essays; it is not difficult to discover the number of words in an average page of "Proceedings" matter, and so to keep an Essay within the 16 pages' limit.

List of additions to the Library during the month of August, 1898.

PRESENTED.	BY WHOM.
Signalling instructions, 1898	Secretary of State.
Hand-book of the Swiss Army, 1898; 2 copies	
Addenda to the Treatise on Military Carriages, 1897	
Netherlands Artillery Atlas; plates 246 to 251	Netherlands Government
Local Standing Orders, Artillery Brigade, Malta, 1898	G.O.C. R.A., Malta
The Journal of the Iron and Steel Institute; Vol. 53	The Council.
Smithsonian Annual Report, June, 1895 ...	Smithsonian Institution.
Smithsonian Miscellaneous Collections; No. 1090: " Review and Bibliography of the Metallic Carbides."	
Report of the Secretary of War (U.S.A.) 1884; Vol. II.; Parts 1 to 4	The Librarian, War Office Library.
Report of the Secretary of War (U.S.A.) 1887; Vols. I. II. (Parts 1 to 4) and III.	
Report of the Chief of Engineers (U.S.A.) 1880; Vols. 1 to 3	
Report of the Chief of Engineers (U.S.A.) 1882; Vols. 1 to 3	
Report of the Chief of Engineers (U.S.A.) 1891; Vols. 1 to 6	
Report of the Chief of Engineers (U.S.A.) 1894; Vols. 1 to 6	
Report of the Chief of Ordnance (U.S.A.) 1878, 1879, 1880, 1881, 1883, 1885, 1886, 1889, 1891, 1893 and 1894.	
Report of the Chief Signal Officer (U.S.A.) 1883, 1886, 1887 (Parts 1 and 2) and 1888 (Parts 1 and 2)	
Six photographs: " Scenes in camp at Tampa, U.S.A."	Poultney Bigelow, Esq.
The destruction of the U.S. battle-ship *Maine*; by Lieut.-Col. J. T. Bucknill, late R.E. (Reprinted from *Engineering*).	The Author.
Messrs. Vickers, Sons and Maxim, Limited: Their works and manufactures; 1 vol. (illustrated)	Messrs. Vickers, Sons and Maxim, Limited.
Bulletins of the campaigns, 1793 to 1799, 1801, and 1803 to 1815 (23 vols.) ...	Col. W. J. Tatham, late R.A.
1 map of Bermuda, 1 map of Mauritius, 11 prints of Réunion, Bermuda and Mauritius and 1 print " Ordnance Hieroglyphics " (No. 1).	Major-General J. B. Dennis, late R.A.
Portrait of Admiral Lord Nelson	Captain C. B. Levita, R.A.
Portrait of an autograph letter from Admiral Lord Nelson to Thomas Forsyth, Esq., dated Merton, February 2nd, 1802. ...	

PURCHASED.

Dictionnaire Militaire ; Part 12.
Report of a Committee appointed by the Secretary of State for War, to consider the decentralization of War Office business, 1898.
Carnet de L'Officier de Marine, 1898.

PRESENTED TO THE MUSEUM,

BY

Major G. E. Benson, R.A. :

4	Remington cartridges	Manufactured in Khartoum.
3	Copper friction tubes	
23	,, M.L. percussion caps	
1	Abyssinian dollar	

WOOLWICH.

On Tuesday, 9th August, 1898, the Royal Artillery Mess, Woolwich, for the first time in its history, it is believed, was the scene of a ladies' dinner party. The occasion was the entertainment of Colonel and Mrs. Eliott Lockhart by the officers serving under the direct command of the Colonel. The ladies of the hosts' families were present to help to do honour to Mrs. Lockhart. Lieut.-Colonel L. J. A. Chapman, R.A., as the senior of the hosts, presided over a party of about 120 and the arrangements made by him and Captain P. H. Slee, R.H.A., the Hon. Sec. of the Mess, for seating and waiting on so large a number were admirable. The only speeches were those of the President in proposing and Colonel Lockhart in returning thanks for the toast of the guests' healths. The former, in a few and admirably chosen words, expressed the genuine regrets of all in Woolwich at the loss to every class of society caused by the departure of the Lockharts and wished them long life and happiness in the home of his retirement.

After dinner the mess room was cleared as rapidly as possible and the band played a selection of music. At 11·45 p.m. Colonel and Mrs. Lockhart took their departure and after entering their carriage through an avenue of officers, under a flourish of trumpets, were dragged home at a rapid run by a strong detachment of subalterns and captains who had unharnessed the horses.

Any member of the Regiment who has had the good fortune to be brought in contact with Colonel Lockhart during his command will acknowledge that the services of himself and of Mrs. Lockhart in their respective spheres have been worthy of somewhat more than conventional recognition.

The fourth volume of "English Army Lists and Commission Registers, 1661-1714," will be published early in October by Eyre and Spottiswoode. This volume will contain several "Artillery trains" and an unique list entitled "Estat de la Compagnie des Canoniers et Bombardiers Anglois qui ont esté en Piemout et à combien monte la paye de chacun par jour, 1696."

Obituary.

LIEUT.-COLONEL F. J. BURRIDGE died at Mhow, 14th July, 1898. He was first commissioned as Lieut. 15th July, 1868; became Capt. 27th August, 1879; Major 13th March, 1885 and Lieut.-Col. 1st April, 1895. Lieut.-Col. Burridge served during the Jowaki Expedition, 1876.

MAJOR-GENERAL H. M. FINLAY (retired) whose death occurred suddenly at Cheltenham, on 11th August, 1898, joined the Madras Artillery as 2nd Lieut. 9th December, 1853; became Lieut. 27th August, 1858; Capt. 29th February, 1864; Major, 5th July, 1872; Lieut.-Colonel 1st October, 1877; Colonel 1st October, 1881 and retired on an annuity with the hon. rank of Major-General 19th June, 1884.

LIEUT.-COLONEL A. H. MACLEAN (retired), died in London on 20th August, 1898. He was commissioned as Lieutenant, 1st November, 1860; became Captain, 29th October, 1873; Brevet Major, 1st July, 1881, and retired with the hon. rank of Lieut.-Colonel, 7th September, 1888.

Lieut.-Colonel Maclean served during the Zulu Campaign, 1879 (medal with clasp). He was appointed British Vice Consul at Dakar in 1894 and Consul in 1896, and was transferred to the Canaries in 1897 with residence at Santa Cruz, Teneriffe.

CAPTAIN W. A. MATTHEWS who died at Hong Kong on 19th July, 1898, joined the Regiment as 2nd Lieut. 23rd July, 1887; became Lieut. 23rd July, 1890 and Capt. 20th Nov., 1897.

NOTES

FROM

CORRESPONDING MEMBERS.

"DUNCAN" GOLD MEDAL PRIZE ESSAY, 1899.

The Subject approved for the "Duncan" Gold Medal Prize Essay, 1899, is as follows:—

"The technical training of officers in Garrison Artillery."

The Rules for the Prize Essays now read:—

The Annual Gold Medal, when awarded, to be accompanied by an *honorarium* of £20; the Silver Medal by an *honorarium* of £10.

The candidates must be Officers of the Regiment who are members of the R.A. Institution.

Officers are requested to confine their Essays to about 16 printed pages of the "Proceedings" other things being equal, brevity will count towards success.

The Essays must be forwarded to the Secretary so as to reach him on or before the 1st of April

Each Essay must be *type-written* in triplicate. The Essays must be strictly anonymous, but each to have a motto, and be accompanied by a sealed envelope with the motto written outside and the name of the writer inside; further, if the writer wishes to recover from the Committee part of the cost of type-writing his Essay he should state this fact in the same sealed envelope and write outside it, above the motto, "to be opened."

All the envelopes thus marked will be opened by the Secretary after the result of the comptition has been announced, and he will send the writers the money for their type-writing expenses.

The Committee will allow a sum of £1 for type-writing each Essay.

The Essays will be submitted for decision to three Judges chosen by the Committee.

The Judges are empowered to recommend:—

1. That two Medals, one Gold and one Silver, be awarded, or
2. That only one Medal, Gold or Silver, according to the merit of the Essay, be awarded, or
3. That no Medal be awarded.

The names of the successful candidates will be announced at the Annual Meeting, and Medallists will be distinguished as such in all Lists, &c., issued from the Institution, and in the event of a University man gaining a Medal, a report of his success will be made to the University of which he may be a member.

The successful Essays will be printed and circulated to members by the Institution.

N.B.—The Committee draw particular attention to the paragraph in the Rules above on the subject of length of Essays; it is not difficult to discover the number of words in an average page of "Proceedings" matter, and so to keep an Essay within the 16 pages' limit.

THE following works are now on sale at the R.A. Institution and will be forwarded post free at the prices noted after their titles below:—

"Twenty-four hours of Moltke's Strategy" by Fritz Hoenig. Translated by Colonel N. L. Walford, price 5s.

"The Shrapnel Fire of the Field Artillery" by Major-General Rohne. Translated by Colonel N. L. Walford, price 2s. 6d.

Major-General Stubbs's "List of Officers of the Bengal Artillery," price 5s. 3d.

"Field Artillery Fire," by Captain W. L. White, R.A., price 1s. 2d.

"Ranging Note-Book," by Captain S. W. Lane, R.A., price 1s. 1d.

"Achievements of Field Artillery," by Major E. S. May, R.A., bound, price 2s. 6d.

"The Value of Mobility for Field Artillery," by Major E. S. May, R.A., paper covers, price 3d

"The Young Officer's 'Don't,' or Hints to Youngsters on Joining," by an Officer R.A., price 7d.

Examination questions in (*c*), (*d*), (*e*) and (*g*) set in the five examinations ending November 1897:—

Captains (*c*), (*d*) and (*g*) ... price 1s. 1d.
Lieutenants (*c*), (*d*), (*e*) and (*g*) price 1s. 1d.

Tables of Four-Figure Logarithms, pocket edition, mounted on linen, price 3d.

"Notes on the early history of the Royal Regiment of Artillery," by the late Colonel Cleaveland, R.A., price 2s.

"Ballistic Tables with an explanation," by A. G. Hadcock, late R.A., price 5s. each, subject to a large discount to members of the R.A.I.

A Visit to Franco-German Battle-fields.

THE Committee R.A.I. have agreed to undertake the organisation of parties of members of the Institution for the purpose of visiting battle-fields in Europe.

The idea is that a party of not less than five should have an itinerary worked out for them before leaving; one member of the party should be told off to study each a portion of the fields to be visited and on the day of the visit to his portion he should be prepared to act as guide so far as study of books and maps can qualify him.

If an officer with previous knowledge of the sites of battles is of the party he might either take entire charge or assist the individual exponents of each site as thought best.

At present the Committee think that a general use of bicycles by the party will greatly facilitate the visits.

The Committee will be glad to receive any hints or suggestions on the subject. The points they wish to emphasize are economy, both of time and money and strict attention to the study of the battle-fields only, as soon as these are reached.

The R.A. Institution will provide a small collection of books and maps for general use by the party.

Captain A. B. Denne has kindly placed the following information at the disposal of the Committee; they publish it with much pleasure and feel sure that if one or two members of the Institution will take the matter in hand forthwith, it will be a simple matter to arrange a trip for 1899; if practice camps, inspections and manœuvres be carried out as this year the most convenient period would seem to be that between 15th July and 7th August. Captain Denne writes:—

Exclusive of those officers R.A. who visit the Franco-German battle-fields, as students at the Staff College, at the public expense—there are many others who go as a matter of interest, and the number of these latter would I feel sure be increased, but for the idea that the trip is an expensive one. Five years ago I went to Metz and Sedan, leaving Woolwich on a Thursday afternoon and being back again by 7 a.m. the following Thursday morning. This entailed going straight through to Metz viâ Ostend. Arriving at Metz Friday afternoon, the Saturday was devoted to driving round the battle-field of Vionville—Mars-la-Tour; Sunday, Gravelotte—St. Privat; Monday (on foot) Colombey—Nouilly; Tuesday, train to Sedan viâ Verdun; Tuesday afternoon and Wednesday morning were employed going over the battle-field of Sedan; and on the Wednesday afternoon I started home again viâ Brussels and Ostend. The cost of this trip was, as far as I remember, between £11 and £12; and at the time I considered it very cheap.

This summer, wishing to go again—but especially to see Weissenburg, Wörth and Spicheren (which I had not seen)—I started 13th June, arriving in London again on 28th June, and the cost was £13. On this trip Cook's tickets were not used—the class travelled on both this and previous trip was 2nd. This trip might have been even cheaper but for the fact that I wished to re-visit Coblenz—where as a small boy I had been for a couple of years at the Gymnasium.

The main saving was effected by taking a bicycle, and thereby obviating the expense of carriage hire at Metz and elsewhere; bicycles were not used in travelling from place to place, but simply for getting about on arrival at one's head-quarters. It is a convenience, where possible, to stay in a place for a few days at a time. Weissenburg was a convenient starting point, being on a main line—and (with a bicycle) within reach of Wörth, which, by train, is rather inaccessible. Except on the steamer, and by train in the Rhine Palatinate, Alsace and Lorraine, a bike travels free, as personal luggage, whilst the ample rack of a continental railway carriage easily accommodates one's gladstone bag, &c.

My bicycle cost me 15s. approximately from the time I left London to the time I returned: and although I did not belong to the C.T.C., I had no trouble with the customs, thanks to going viâ Flushing. (The Flushing route to Cologne is considerably cheaper than either the Ostend or Calais one, and is only one hour longer than the former, and half an hour than the latter). The bicycle, besides saving a good deal of walking, in places where one would have had to leave one's hired carriage, practically saved three whole days carriage hire at Metz, one at Wörth, half-a-day each at Weissenburg and Saarbücken—not to mention Coblenz and Mannheim.

The following short diary shows the route taken:—

Monday 13th June.—Left Victoria 8.50 p.m. for Flushing.

Tuesday 14th June.—Arrived Coblenz about 2 p.m.

Thursday 16th June.—By Rhine-steamer—left Coblenz 6 a.m., arrived Ludwigshafen (opp. Mannheim) 7 p.m.

Friday 17th June.—Left Ludwigshafen 1.45 p.m. train, arrived Weissenburg 3.41 p.m. Went round battlefield of Weissenburg that afternoon.

Saturday 18th June.—Biked to Wörth by following route:—Weissenburg—Rott—Kleeburg—Lobsann—Lampertsloch—Preuschdorf—Mitschdorf—Görsdorf—Liebfrauenthal—Mattstall—Langensulzbach—Nehweiler—Fröschweiler—Morsbronn—Wörth—Diefenbach—Sulz—back along main road to Weissenburg.

Distance 45 miles, time about 12 hours.

Sunday 19th June.—Remainder of my party trained to Strasburg for the day—I went to Wörth again by bike, route:—Weissenburg—Klimbach—Lembach—Liebfrauenthal—Wörth—Fröschweiler—Elsasshausen—Fröschweiler—Reichshofen—Eberbach—Gunstett—Surburg—Sulz—Weissenburg.

Distance 44 miles, time about 11 hours.

Monday 20th June.—Left Weissenburg about 1 p.m. and trained to Metz viâ Bitsche and Saargemünd. Made Metz head-quarters till Saturday. It would have been better to have gone to Saarbrücken this day and on to Metz Tuesday afternoon.

Tuesday 21st June.—Visited battle-fields of Colombey (14th Aug.) and Noisseville (31st Aug.) biking viâ Grigy—Mercy—Ars-Laquenexy—Ch. Aubigny—Colombey—Borny—Belle Croix—la Planchette—Montoy—Noisseville—Servigny—Poix—back to Metz by Fort St. Julien (Manteuffel), getting a good view of most of the ground to the South, visited earlier in the day.

Distance not more than 20–25 miles—going bad in one or two places, where paths had to be taken.

Wednesday 22nd June.—Vionville—Mars-la-Tour. Biked viâ Moulins-les-Metz—Gravelotte—Rezonville—Mars-la-Tour[1]—Rezonville—Gorze—Novéant—Corny—Jouy-aux-Arches—Metz.

Thursday 23rd June.—Gravelotte—St. Privat. Biked viâ Moulins-les-Metz—Amanweiler—St. Privat—Roncourt—St. Privat—St. Marie aux Chênes—St. Ail—Habonville[2]—Verneville—Malmaison—Gravelotte—back to Metz.

Friday 24th June.—Trained to St. Johann (opp. Saarbrücken). Biked viâ Saarbrücken—Ehrenthal—Rotherberg—Spichern—Forbach to St. Avold and trained back to Metz.

Saturday 25th June.—Trained to Trèves—where a very interesting day can be spent visiting the Cathedral, Churches, and old Roman remains in excellent preservation, such as the palace, Amphitheatre, Porta Nigra, baths, &c.

Sunday 26th June.—Left Trèves about 6.30 p.m., arriving in Cologne at midnight.

Monday 27th June.—The day—up to 6 p.m. (when the train for Flushing left) was all too short to see much of the various places of interest.

Tuesday 28th June.—Arrived Victoria 7.50 a.m. with bicycles none the worse for the journey.

---

[1] At Mars-la-Tour there is a French Customs Station where bikes have to be left; or duty (recoverable from Verdun) paid; we were allowed however to bike out towards Bruville, as we were re-crossing the frontier by Mars-la-tour.

[2] St. Ail and Habonville are in France but there is no Customs Station at either place.

List of additions to the Library during the month of September, 1898.

PRESENTED.	BY WHOM.
Report of the Examination held in May, 1898, of Officers of Regular Forces, Militia, Yeomanry and Volunteers, in subjects (c), (d), (e), (f), and (g).	Secretary of State.
Report upon the Seventeenth Senior Class at the Artillery College. Two copies.	Director General of Military Education.
Map of Khartum and Omdurman, 1898.	Director of Milit'y Intelligence.
Special Reports on Explosions, No. CXXIX.	H.M. Inspector of Explosives.
Examination Papers, Royal Military Academy, Woolwich, June, 1898.	The Governor.
Handbook on Manœuvre Orders, 1898; by Major F. Trench, R.A.	The Author.
Minutes of Proceedings of the Institution of Civil Engineers, Vol. 133, 1897-8; Part III.	The Council.
Report of the Committee of the Institution of Civil Engineers on the thermal efficiency of steam-engines.	The Council.

PURCHASED.

Maps (set of five), Military Manœuvres, 1898.
Handbook on Manœuvre Orders, 1898; by Major F. Trench, R.A.
German-English Dictionary; Part VII ;Vol. II.; by Professors Muret and Sanders.
Biologia Centrali-Americana—Zoology; Part 143.
A Monograph of the Turdidæ, or family of Thrushes; Part IV.

JUBILEE COMMEMORATION WINDOWS.

THE list below contains the names of all subscribers to the Jubilee Commemoration Windows in Dining Hall, R.M. Academy, Woolwich, up to and including 8th August, 1898.

	£	s.	d.		£	s.	d.
Allen, Major J. R. H.		10	0	Bishop, 〃 C. F.		5	0
Alderson, General *Sir* H. J., K.C.B.	1	1	0	Barton, 〃 R. L.		10	0
Blake, Colonel C. J.		10	0	Breeks, Captain R. W.		5	0
Barlow, Captain H. W. W. ...		10	0	Bland, Major F. M.		5	0
Bateman, 〃 B. M.		5	0	Bond, Captain R. F. X. Mac G....		5	0
Bell-Irving, Major A.		10	0	Birch, Lieut. E. M.		5	0
Bowles, Colonel F. A.	1	1	0	Brady, Major R. M.		5	0
Burgmann, General G. J. ...	1	1	0	Browell, Colonel E. T.		10	0
Bisset, Colonel W.	1	1	0	Bayley, 〃 F. G.	1	0	0
Bartley, Lieut. S. C.		10	0	Brough, 〃 J. F.	1	0	0

(*Continued on next page.*)

	£	s.	d.
Brendon, General A.	1	1	0
Blaksley, Colonel E.	1	0	0
Blackwood, Major P. F.		10	0
Combe, Captain K.	2	0	0
Cambier, Colonel E. F.		5	0
Carbutt, Lieut. E. G.		10	0
Courtenay, Captain M. H.		10	0
Curling, Colonel H. T.	1	0	0
Clayton, " E.	1	1	0
Cochrane, Lieut. N. D.		5	0
Craig, Major J. F.		5	0
Cumberland, General W. B.	1	1	0
Donaldson, Captain F. L.	1	1	0
Davson, Lieut. H. M.		5	0
Dunnage, Colonel A. J.		5	0
Dickson, General *Sir* Collingwood V.C., G.C.B.	2	0	0
Drake, Captain B. F.		10	0
Dillon, Colonel *Hon.* R. V.		10	0
Downing, Colonel C. M. H.	1	1	0
Dreyer, Lieut. J. T.		5	0
Du Plat, General *Sir* C. T., K.C.B.	2	2	0
Emery, Lieut. W. B.		5	0
England, Colonel A. E.		10	0
Furse, Captain W. T.	1	0	0
Fitzgerald, Lieut. M. J. F.		5	0
Forsyth, Lieut. J. A. C.		10	0
Ferrier, Colonel A. W.	1	0	0
Fishe, Lieut. A. F. B.		2	6
Farmer, Major-General R. O.		10	0
FitzHugh, General H. T.	1	0	0
Fowler, Lieut. W. J.		2	0
Geary, General H. Le G.		10	0
Gordon, Major A. W. B.		5	0
Gardiner, Lieut. H. W.		2	6
Hickman, Major H. P.	1	0	0
Hammond, Colonel P. H.	1	0	0
Hardcastle, Lieut. J. H.		5	0
Hill, Captain C. E.		5	0
Haywood, Lieut. A. H. W.		2	6
Harness, General A., C.B.	1	0	0
Hare, Captain R. H.		3	0
Hall, Lieut. F.		2	6
Hogg, Lieut. R. E. T.		2	6
Hutchinson, General W. F. M.	1	0	0
Hope, General J. E.		5	0
Hanwell, General J.	1	0	0
Hawkins, " A. C.	1	0	0
Henry, Colonel G. C.		10	0
Hill, General C. R.	1	0	0
Howard, Major C. A.		2	6
Howard-Vyse, Lieut. C.		10	0
Innes, Colonel F. N.		10	0
Jervois, Major C. E.		5	0
Johnson, General G. V.	2	0	0
Keane, Lieut. *Sir* J. *Bart.*		5	0
King-Harman, Colonel W. H.	1	0	0
King, General A. H., C.B.	1	0	0
Knox, Colonel W. G., C.B.	1	0	0
Lynes, Colonel S. P.	1	1	0
Lloyd, Captain M. B.		5	0
Laird, Captain G.		5	0
Lewis, Lieut. G.		2	6
Livingstone-Learmonth, Lieut. L. C.		10	0
Lennard, Colonel *Sir* J. F., *Bart.*	1	0	0
Lockhart, Colonel R. D. E.	1	0	0
Leach, Major R. P.	1	0	0

	£	s.	d.
Lukin, General W. W. A.	1	1	0
Magenis, General H. C.	1	0	0
Murdoch, Colonel W. W.		10	0
McMeekan, Captain F. H. F. R.		5	0
Molesworth, Lieut. H. E.		2	0
Moberly, Lieut. A. H.		3	0
McKenzie, Lieut. H. F.		3	0
May, Major E. S.		10	0
Mackenzie, Captain C. G.		5	0
Murray, Major A. M.		5	0
Mallock, Lieut. A. M. R.		5	0
McLeod, Major R. G. M'Q		5	0
Morrice, Lieut. H.		2	6
Morrieson, Major H. W.		10	0
Maberly, Major C. E.		10	0
Molesworth, Colonel A. O.	1	0	0
Maberly, General E., C.B.	1	0	0
Murray, Colonel J. M.	1	1	0
Maclean, General P.		10	0
Nicolls, General O. H. A.	1	1	0
Noyes, Colonel G. A.	1	1	0
Norris, Captain A. G.		10	0
O'Callaghan, Colonel D. D. T.	1	0	0
Ouchterlony, Colonel T. H.	1	0	0
Owen, General C. H.	1	0	0
Pearse, General G. G., C.B.		10	0
Playfair, Lieut.-Col. *Lord* G. J.	1	0	0
Patch, Captain F. R.		3	6
Penton, Colonel A. P.		10	0
Porter, Captain H. R.		7	0
Pearse, Major-General A. T. G.	1	0	0
Pretyman, Captain E. G.	1	1	4
Parry, Lieut.-Col. G. S.		10	0
Pollard-Urquhart, Colonel F. E. R.	1	0	0
Rochfort-Boyd, Lieut. H. C.		2	0
Ross, Captain H. St. G.		10	0
Roberts, Field-Marshal *Rt. Hon.* F. S. *Lord* V.C., K.P., G.C.B., G.C.I.E., G.C.S.I.	2	0	0
Rideout, General A. K.	1	1	0
Rainsford-Hannay, Colonel, R. W.	1	0	0
Rait, Lieut.-Colonel A. J., C.B.	1	0	0
Ritchie, Major-General J.	1	0	0
Robinson, Lieut. J. A. P.		5	0
Slade, Colonel J. R., C.B., *A.D.C.*	1	0	0
Stewart, General R. Mc G.	2	10	0
Stokes, General O. R.		10	0
Sandes, Colonel H. T. T.		10	6
Savile, Captain H. B. O.	2	2	0
Simpson, Major-General W. H. R.		10	0
Soames, Captain H.	1	1	0
Stocker, Colonel M. E. C.		10	0
Stewart, General A. A.	1	0	0
Stirling, Major J. W.		10	0
Simpson, Major G. G.		10	0
Simpson, Major H. C. C. D.		5	0
Stapylton, Lieut. G. J. C.		10	0
Shewell, Major H. W. M.	1	0	0
Trench, Colonel C. C.		10	0
Taylor, Colonel P. T. H.	2	0	0
Tailyour, Lieut. G. H. F.		5	0
Toms, Major F. B. R.		10	0
Torriano, Colonel C. E.		10	0
Wellesley, Captain R. C.		5	0
Williams, General A. H. W.	1	0	0
Watkin, Colonel H. S. S., C.B.	1	0	0
Younger, Colonel J.		10	0
Total	£102	7	4

Foreign Stations.

The Committee will be greatly obliged if a member at each foreign station will send to the Secretary R.A.I. answers for that station to each of the questions given below.

These answers are kept in the Institution and are constantly asked for by officers under orders to serve abroad; several of the forms have not been revised since they were compiled more than twelve years ago and are consequently out of date. The answers can be filled in so as to give the fullest information and any extra remarks will be welcome.

Questions :—

1. To what Military District does it belong ?

2. What force of Artillery is quartered there ?

3. Is there a Commanding Officer, R.A., or, if not, where are the Artillery Head-quarters ?

4. What other troops are usually quartered there ?

5. What accommodation as regards Royal Artillery is there for—

(1.) Field Officers. (2.) Officers in general. (3.) N.-C. officers and men. (4.) Married families. (5.) Horses.

If there is no married accommodation for married Officers, are houses readily obtainable ? Should furniture be brought out : if so of what nature ?

6. Are there any detachments ? If so, where ?

7. What are the communications ? (As regards stations abroad, where there is no railway, full particulars are requested.)

8. What is the nature of the climate ? (Foreign stations only).

9. Is there a Regimental Mess, or have batteries stationed here to be self-supporting in this respect ?

10. Please give similar information regarding Canteens and Recreation Rooms.

11. Is there any sport obtainable in the neighbourhood ? If so, of what kind ?

12. Please give any information that may be thought useful to Officers when ordered to the Station, whether individually or with their Batteries, particularly that relating to varieties of clothing according to the changes of season and the advisability of bringing clothes out or obtaining them locally.

Ancient Gun.

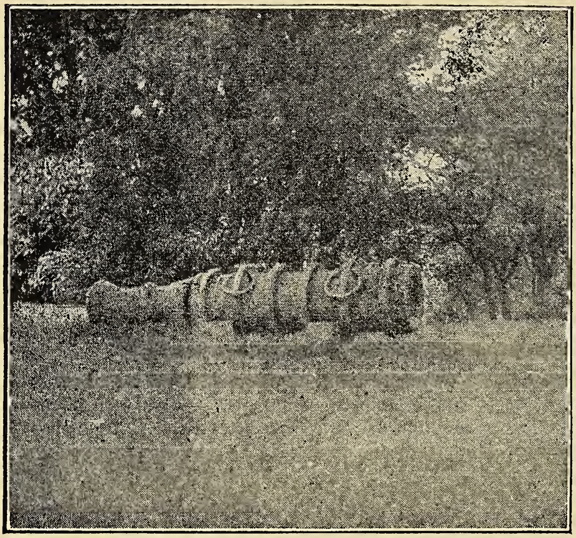
The gun of which a photograph is here reproduced is the property of E. A. Lee, Esq., Fowley, Liphook, who has most kindly given the following description and details :—

Three guns (1 perfect and 2 broken) were sent into some iron works, with which my father was connected, as old iron. They were said to have been fished up from the sea at the mouth of the Bristol Channel somewhere about St. Ives. My father took the perfect one and Mr. F. J. Mitchell took the two broken ones.

The dimensions of the perfect one are—

Length	5′4″
Outside diameter	11½″
Bore where shot went	7½″
Length of bore for shot	3′2″
Length of bore for powder	1′9″

The gun has 6 rings shrunk on $1\frac{1}{2}''$ thick and $1\frac{1}{2}''$ wide.
Diameter of outside of powder chamber about $7''$.
Bore of powder chamber about $2\frac{1}{2}''$.

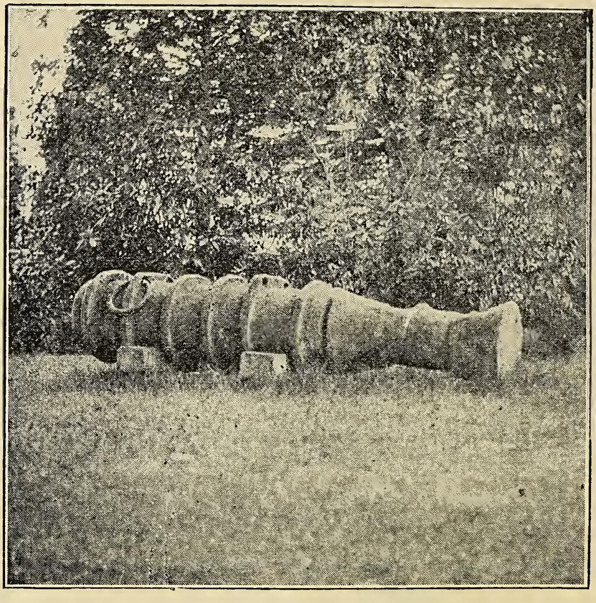


The gun appears to have a screwed on breech and possibly the powder chamber could be opened for loading purposes as there is a cavity round the gun which has rusted out to about the depth of $1\frac{1}{2}''$.

Mr. Mitchell's guns are of the same construction and in the breakage it can be seen that they were built up by longitudinal pieces of iron welded together and then strengthened by the rings being shrunk on.

I believe there are some similar guns in the Tower of London, but they are not so perfect as the one I have got :—

This gun is as old as any of its size in the Rotunda Museum and from the description and picture seems to be in a state of better preservation than many in that collection. In construction it somewhat resembles gun No. 7, Class I., Rotunda Museum, though some two feet shorter than that gun and not of the same symmetrical shape and finish.



Any information bearing on the gun or its probable history will be gladly received by the Secretary R.A.I.

Singapore.

A cricket match was played on Saturday, the 23rd July, between the officers of H.M.S. Hermione and an XI. nominally composed of officers R.A. As, however, there were only eleven gunner officers in the district at the time, three of whom were unavoidably absent, it was found necessary to make up with a corresponding number of N.C.O's.

The match was played at Blakan Mati (an island where a large number of the R.A. are stationed) and resulted in a win for the gunners on the 1st innings. There was not time to finish the 2nd innings, although play was continued vigorously all through the heat of the day. The score was as follows :—

ROYAL ARTILLERY.

1st Innings.		*2nd Innings.*	
Capt. Langhorne, c Ballard, b Scott	15	retired	56
Q.-M. Sergeant Blease, c Ballard, b Wilson	3	not out	8
Master Gunner Bates, b de Thoren	30	b de Thoren	34
Captain Campbell, b Wilson	29		
Lieut. Reid, b Wilson	0	c Scott, b Wilson	9
Lieut. Cruickshank, b Wilson	1		
Lieut. Webb, not out	14	not out	4
Capt. Farmar, b Wilson	1		
Sergt. Cooper, lbw, b Wilson	2	c Little, b Ballard	11
Lieut. Mc Donell, b Wilson	0		
Lieut. Burton, b de Thoren	0		
Byes	3	Byes	8
		Leg byes	1
Total	98	Total	* 131

* Innings declared closed.

H.M.S. "HERMIONE."

1st Innings.		*2nd Innings.*	
Mid. de Thoren, lbw, b Bates	9		
Mid. Little, b Blease	0		
Lieut. Goodenough, b Bates	1	b Langhorne	0
Dr. Sparrow, b Blease	15	c Campbell, b Langhorne	28
Wilson, b Bates	31		
Capt. Callaghan, b Blease	5		
Lieut. Ballard, lbw, b Blease	6	not out	1
Mid. Scott, b Bates	0		
Sub-Lieut. Alexander, b Blease	6	b Blease	3
Mid. Neild, b Blease	7	not out	19
,, Hutton, not out	3		
Extras	2	Extras	8
Total	85	Total	59

Sea Fishing &c., at Bermuda.

The information furnished by the R.A. Institution to 21 Co. W.D. before leaving England in April last was somewhat misleading where those notes mention sea fishing as "indifferent."

An officer of the Worcester Regiment between the 3rd March and 16th June, 1898, has taken 2,815lbs., largest fish 82lbs.; it is to be hoped he will give the public the benefit of his experience as his knowledge of the fish here, their habits and how to capture them, is unique; this bag includes 58 different fish.

My own experience fishing from a boat is as under:—

1st afternoon, 3 lines, 90lbs. weight.
2nd afternoon, 3 lines, nil.
3rd day, 5 lines, 400lbs. weight.
4th day, 5 lines, 60lbs. weight.
5th day, 9 lines, 250lbs. weight.
6th day (Challenger Bank) 8 lines, 450lbs. weight.

Nearly everybody sea-sick and steamer not properly anchored or else the bag would have been big.

The "ground" fish are not of a very sporting nature but the floating fish play well; unfortunately as far as experience goes they do not take an artificial bait freely. Very seldom is fishing without its drawbacks; here owing to numberless reefs, &c., a pilot is a necessity, bait is also troublesome to obtain. The general proceedure is to capture fry with a casting net or buy crayfish and with light lines catch fish from 2oz. to 2lbs. for bait: this, however, causes delay and the "rise" may be lost.

Generally speaking the fish are on certain small rocky patches or runs, marks have to be taken carefully also set of boat from wind and tide to be considered. It is emphatically not a place where you can row or sail out in any direction, drop killick and expect a big bag. The bottom is mostly jagged or fan coral and is very destructive to gear and enables ground fish to "rock" you and get off.

I am not in a position to mention all the species and confine myself to those ordinary taken.

Floating fish.—*i.e.*, those taken above the bottom and which do not make for it when hooked and which afford sport with a rod. Amber fish (go up to lbs. 150), gruelli, horse mackerel, bonito, barracouta, gar-fish, barbers, yellow tails, snappers, chub, bream, blue fish, &c.

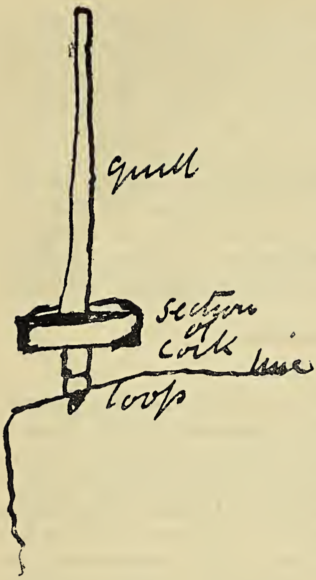
Ground fish.—Rock fish (up to lbs. 120), salmon rock fish, gropurs also called rock hamlet, hog-fish, Spanish hog-fish, angel fish, hind, nigger, moray, porgi. The extraordinary hedge-hog fish is also occasionally caught. A tarpon rod and sea reel are suitable for floating fish; for ground fish the bait rests on the bottom, you can give no line or you are immediately "rocked" or your line severed.

Ground fish when caught swell out and have to be "winded," they are generally kept in ponds till required for use, Porgi fishing with rod is good especially in winter.

Small sharks are often a nuisance. A small hatchet is a necessity in the boat.

For ground fish, let your lead which is about 8 inches from bait rest on the bottom easing off line for rise and fall of boat, do not shake lead or bait or you will not get a good fish.

Another description of fishing which officers and men enjoy at Ireland Island is for bream and chub from the rocks with rod or hand line. These run in shore, to about 6lbs., but the average about 2lbs. The bream bite firmly but are exceedingly difficult to hook owing to hard seed-like bones insides the mouth, the chub gently suck the bait off and it is extremely difficult to strike at the right time and the only way I have been at all successful is when using a sensitive float similar to that described in Thomas's *Tank fishing in India.* An



upright goose or porcupine quill in a section of cork; when the quill nearly or quite disappears strike.

When hooked the chub is the gamer fish of the two and fights manfully, they have a trick of running into the rocks close under your feet and as the foothold is generally too rough to retreat backwards, it often results in a broken top-piece.

Bait.—Dough, cooked or raw meat, lobster, &c., they appear to like dough best, but the number of baits taken off by the chub and small fry ("Sergts.-Major," "robins," "grunts,") is stupendous and trying to the temper. Throwing pieces of stale bread on the water helps to keep away these small pests.

No rods are obtainable in Bermuda, and for this fishing a light stiff rod 12 to 14ft., a strong reel, stout gut casts, brown unvarnished line should be brought from home. Hooks and heavy lines for bottom fishing can be obtained on the Islands. Bring a landing net with long handle.

Amusements are not numerous here and for the sake of recreation and health sea fishing is excellent, so difficult do I find catching these fish from the rocks that one dozen, and this only on a few occasions, have been the total bag: I firmly believe that this could be at least trebled if one knew when to strike.

Captain MacCarthy, R.A., who does not affect to be an experienced fisherman caught 15 one night by striking when the line of phosphorescence made by the fish was in a certain position with his bait; the sensitive float could not be clearly seen and very little could be felt, except when the fish was on and then ensues a five to ten minutes struggle. This fishing was on in May but the fish seem to have moved off the coast since the middle of July.

Boat Sailing.—Good; but reefs so numerous it is risky going far without an experienced pilot.

The fishing I have done has been mostly in about 14 to 10 fathoms, in shallower water where it is possible to use a "water glass" (a box with glass bottom which takes off the ripple and enables one to see the bottom) it is a most interesting performance watching the fish. Your bait, with lead attached close to it, rests on the bottom and the methods of the fish in taking or avoiding it can be watched: frequently a big rock fish will observe the bait for hours generally taking it in the end if not alarmed. Fish should be carefully handled most of them have spikes and many have them in unexpected places.

In my opinion the most useful boat for fishing is a 30ft. whale boat with centre board, an excellent sea boat and can be rowed if wind fails.

Pilots are as a rule good seaman and understand fishing, but are not entirely satisfactory to deal with. Bait as I have already noticed is a difficulty and moreover owing to rapid decomposition smells offensively. One must be a good sailor which is perhaps synonomous with having a strong stomach and it is not feasible to use the same boat for fishing on one day and on another taking out a party of ladies! I think it due to point out the disadvantages strongly as if a man is not really keen on fishing, they may preponderate: moreover there are a certain amount of risks to be run; one of which was very much impressed off a rocky point on a lee shore only two days ago, but this equally applies to ordinary sailing. In Bermuda especially in the afternoon if you try and read it generally ends in a perspiring sleep from which one awakes unrefreshed and irritable, sea fishing is one way to avoid this and emphatically is not "indifferent." I must apologise for the disjointed way this is put together, but writing has somewhat the same effect as reading.

Obituary.

LIEUT.-COLONEL J. D. CUNNINGHAM died at Jutogh on 21st August, 1898. He was first commissioned as Lieut. 12th September, 1872; became Capt. 21st December, 1881; Major 14th September, 1889, and Brevet-Lt.-Col. 22nd January, 1896. Lieut.-Colonel Cunningham served during the Zhob Valley Expedition, 1884; (mentioned in despatches); Burmese Expedition, 1886–87; (despatches, G.G.O. 864 of 1887; medal with clasp); Sikkim Expedition, 1888; (clasp); Miranzai (2nd) Expedition, 1891; commanded the Royal Artillery during the capture of the Samana; (despatches, *London Gazette*, 15th September, 1891; clasp); Isazai Expedition, 1892; operations in Chitral, 1895, with the relief force; commanded the Royal Artillery during the storming of the Malakand Pass; action near Khar; (despatches, *London Gazette*, 15th November, 1895; Brevet of Lieut.-Colonel, medal with clasp); operations on N.W. Frontier of India, 1897; operations of the Mohmand Field Force, action at Badmanai Pass; (despatches, *London Gazette*, 11th January, 1898).

LIEUT. H. S. McCLINTOCK (retired) died at Hillsborough, Co. Down, on 9th September, 1898. He joined the Royal Artillery as 2nd Lieut. 26th July, 1831; became Lieut. 27th September, 1832, and resigned 8th February, 1840. Lieut. McClintock was at the time of his death a J.P. and D.L. for the Co. Down.

CAPTAIN *HON.* R. E. M. MOSTYN, who died at Bombay on 31st August, 1898, joined the Regiment as Lieut. 26th July, 1881, and became Capt. 1st Feb., 1890.

LIEUT.-COLONEL E. SIMEON (retired) whose death occurred at Gisbourne, New Zealand, on 11th July, 1898, was first commissioned in the Bengal Artillery as 2nd Lieut. 13th December, 1845; became Lieut. 16th May, 1852; 2nd Capt. 27th August, 1858; 1st Capt. 1st July, 1864; Major 5th July, 1872 and retired with the hon. rank of Lieut.-Colonel, 1st August, 1872. Lieut.-Colonel Simeon served during the Punjab Campaign, 1848–9, including the action at Ramnuggur; battles of Chillianwallah and Goojerat and pursuit of the Sikhs and Afghans to Peshawar; (medal with two clasps); with the Peshawar Field Force under Sir Colin Campbell, 1851; Indian Mutiny, 1858, including the actions of Chanda, Umeerpore and Sultanpore; siege and capture of Lucknow; affair at Koorie; commanded the Bengal Artillery with the field force, under Brigadier-General Douglas, from 1st October to 20th December, 1858; (despatches, medal with clasp).

2ND LIEUTENANT E. V. TIGHE died at Quetta on 9th September, 1898. He was first commissioned on 21st March, 1896.

11

NOTES

FROM

CORRESPONDING MEMBERS.

"DUNCAN" GOLD MEDAL PRIZE ESSAY, 1899.

THE Subject approved for the "Duncan" Gold Medal Prize Essay, 1899, is as follows:—

"The technical training of officers in Garrison Artillery."

The Rules for the Prize Essays now read:—

The Annual Gold Medal, when awarded, to be accompanied by an *honorarium* of £20; the Silver Medal by an *honorarium* of £10.

The candidates must be Officers of the Regiment who are members of the R.A. Institution.

Officers are requested to confine their Essays to about 16 printed pages of the "Proceedings" other things being equal, brevity will count towards success.

The Essays must be forwarded to the Secretary so as to reach him on or before the 1st of April

Each Essay must be *type-written* in triplicate. The Essays must be strictly anonymous, but each to have a motto, and be accompanied by a sealed envelope with the motto written outside and the name of the writer inside; further, if the writer wishes to recover from the Committee part of the cost of type-writing his Essay he should state this fact in the same sealed envelope and write outside it, above the motto, "to be opened."

All the envelopes thus marked will be opened by the Secretary after the result of the comptition has been announced, and he will send the writers the money for their type-writing expenses.

The Committee will allow a sum of £1 for type-writing each Essay.

The Essays will be submitted for decision to three Judges chosen by the Committee.

The Judges are empowered to recommend:—

1. That two Medals, one Gold and one Silver, be awarded, or
2. That only one Medal, Gold or Silver, according to the merit of the Essay, be awarded, or
3. That no Medal be awarded.

The names of the successful candidates will be announced at the Annual Meeting, and Medallists will be distinguished as such in all Lists, &c., issued from the Institution, and in the event of a University man gaining a Medal, a report of his success will be made to the University of which he may be a member.

The successful Essays will be printed and circulated to members by the Institution.

N.B.—The Committee draw particular attention to the paragraph in the Rules above on the subject of length of Essays; it is not difficult to discover the number of words in an average page of "Proceedings" matter, and so to keep an Essay within the 16 pages' limit.

THE following works are now on sale at the R.A. Institution and will be forwarded post free at the prices noted after their titles below:—

"Twenty-four hours of Moltke's Strategy" by Fritz Hoenig. Translated by Colonel N. L. Walford, price 5s.

"The Shrapnel Fire of the Field Artillery" by Major-General Rohne. Translated by Colonel N. L. Walford, price 2s. 6d.

Major-General Stubbs's "List of Officers of the Bengal Artillery," price 5s. 3d.

"Field Artillery Fire," by Captain W. L. White, R.A., price 1s. 2d.

"Ranging Note-Book," by Captain S. W. Lane, R.A., price 1s. 1d.

"Achievements of Field Artillery," by Major E. S. May, R.A., bound, price 2s. 6d.

"The Value of Mobility for Field Artillery," by Major E. S. May, R.A., paper covers, price 3d

"The Young Officer's 'Don't,' or Hints to Youngsters on Joining," by an Officer R.A., price 7d.

Examination questions in (*c*), (*d*), (*e*) and (*g*) set in the five examinations ending November 1897:—

Captains (*c*), (*d*) and (*g*) ... price 1s. 1d.
Lieutenants (*c*), (*d*), (*e*) and (*g*) price 1s. 1d.

Tables of Four-Figure Logarithms, pocket edition, mounted on linen, price 3d.

"Notes on the early history of the Royal Regiment of Artillery," by the late Colonel Cleaveland, R.A., price 2s.

"Ballistic Tables with an explanation," by A. G. Hadcock, late R.A., price 5s. each, subject to a large discount to members of the R.A.I.

List of additions to the Library and Museum during the month of October, 1898.

PRESENTED.	BY WHOM.
War Establishments, 1898	Secretary of State.
The Royal Warrant, 1898	
Regulations for Army Ordnance Services, 1898	
Colored Lithographs, R.C.D., 249 and 250; R.L. 256	
Addendum to Treatise on Service Ordnance, 1898	
Annual Report (1897–8) by the Inspector General of Artillery in India. Four copies.	Inspector General of Artillery in India.
Special Reports on Explosions; No. 128 ...	H.M. Inspector of Explosives.
Netherlands Artillery Atlas; plates 135 to 140, and 252 to 257	Netherlands Government.
Smithsonian Miscellaneous Collections; No. 1,093. "A catalogue of scientific and technical periodicals."	Smithsonian Institution.
Le Bombardier Francois, ou nouvelle methode de jetter les Bombes avec precision; par M. Belidor. Paris 1731	Major G. T. Kelaart, R.A.
Digest of Services of No. 18 Company Eastern Division, R.A.	Major J. H. Leslie, late R.A.

Calcul des probabilités et les applications au tir et réglage du tir. 1898	Colonel N. Zaboudski.

MUSEUM.

Nine Fuzes collected at Abbassiyeh in 1882, during the first British occupation of Egypt.	Lt.-Col. The Hon. R. Allsopp late R.A.

PURCHASED.

Dictionary of National Biography; Vol. LI.
Russia's Sea Power, past and present, or the rise of the Russian Navy; by Colonel Sir George S. Clarke, K.C.M.G., F.R.S.
Monograph of the Paradiseidœ, or Birds of Paradise; Part VIII.
Kriegsgeschichtliche Beispiele aus dem Deutsch-Französischen Kriege von 1870-71; Parts VIII and IX.
Règlement sur les manœuvres des Batteries Atteleés. 2 vols.

R.A. Woolwich, Pony Club and Polo.

A meeting was held at Woolwich, on July 22nd, which was well attended by those interested in polo; Colonel Elliot Lockhart in the chair.

It was decided that a Polo Pony Club would be very beneficial to the game at Woolwich, and also prove an assistance to the R.A. team in the inter-regimental tournament. The idea is that the club should provide a certain number of ponies which can be hired out to members at the rate of £2 5s. 0d. per month for the summer months; during this period they will be kept by the hirer, and by the club during the winter. By these means it is hoped that more officers will be able to play polo, and that the class of pony will be improved.

A committee was appointed consisting of:—

President:
Major Holland, R.H.A.
Members:
Captain Hanwell, R.A.,
" Mackenzie, R.A.,
Lieut. Sandars, R.A.,
" Lamont, R.H.A.

The committee to have the entire management of the ponies, their purchase, sale, and keep during the winter.

Rules, which can be seen in the Mess or on application to the committee, were drawn up and approved. The sum of £1,500 has been borrowed at 1 % over bank rate, and the purchase of ponies has already commenced.

It is hoped that officers who are interested in the furtherance of the game in the Regiment will become non-playing members, the subscription for which is 5s. a month, which will entitle them to the use of ponies at Gymkhanas, and to drive or hack during the winter.

On the whole the polo season at Woolwich may be regarded as a successful one. We should certainly have liked to have seen a few more players and we hope that the new pony club will bring about the desired result next season.

Play commenced on the 18th April and continued without interruption until 18th August when the batteries left Woolwich for manœuvres.

We were fortunate in being supported by the detachment of the Royals, and by Captain Ramsay of the Rifle Brigade.

A Gymkhana was held on 26th July and proved a great success.

The annual tournament commenced on 25th July and was won by the Rovers, consisting of Captain Jenner, Mr. Court, Mr. Hobson and Mr. Thynne, who beat the R.A. team, consisting of Captains Hanwell, Mackenzie and Schofield, and Lieut. Lamont in the final.

It is hoped that next season will prove even more successful, and that it will be found possible to send up a good team for the Inter-regimental Tournament.

Clifton Picture Fund

The following is a list of the donations already given to the Clifton picture fund. Mr. Clifton has sent one oil picture, two large black and white pictures and a small water-color, which can be seen in the Staff house at the R.M.A. He wishes us to keep them all.

	£	s.	d.
Atkinson, Captain, R.E.		5	0
Barlow, Major G. N. H., R.A. ...		10	0
Blair, Captain, R.E.		5	0
Browne, General *Sir* J. F. M., K.C.B., R.E.	1	0	0
Cameron, Major, *late* R.E.		10	0
Conner, Major W. D., R.E.		5	0
Cunningham, Lt.-Col. *late* R.E. .		5	0
Curteis, Major F. A., R.A....		5	0
Dalton, Lt.-Col. J. C., R.A.		5	0
Dickie, Major J. E., R.E.		5	0
Digby, Captain W. T., R.E.		10	0
Dunlop, Major H. C., R.A.		5	0
Enthoven. Major P. H., R.A.		5	0
Fawkes, Lt.-Col. L. G., R.A.	1	0	0
Garston, Captain E. J., *late* R.A. ...		5	0
Gartside-Tippinge, Major E. A., R.A.		5	0
Gale, Captain H. R., R.E.		10	0
Gubbings, T., Esq.		10	0
Guggisberg, Lieut. F. G., R.E. ...		5	0
Headlam, Captain J. E. W., R.H.A.		10	0
Hibbert, Major, A. L., R.A.		10	0
Honner, Major, W. J., *late* R.A. ...		10	0
Carried forward	9	0	0
Brought forward	9	0	0
Jackson, Major, R.E.		10	0
Johnstone, Captain	2	0	0
Lake, Lieut.-Colonel N. M., R.E.		5	0
MacDonnell, Major, A. C., R.E.		10	0
Molony, Captain F. A., R.E. ...		5	0
Marsh, Colonel, *late* R.E	1	0	0
Oldfield, Major F. H., R.E. ...	3	3	0
Osborne, Major, W., R.A.		5	0
Perceval, Major E. M., R.A. ...	1	0	0
Perceval, Captain, E. C., R.E. ...		5	0
Rupell, Lieut. R. F. M., R.E.		5	0
Stuart, Major A. R., R.A.... ...		5	0
Sim, Major G. H., R.E.		10	0
Simmons, Fd.-Ml., *Sir* Lintorn...	1	0	0
Thompson, Capt. W. A. M., R.A.		5	0
Thuillier, Captain H. F., R.E. ...		5	0
Townshend, Major E., R.E. ...		5	0
Travers, Captain	1	0	0
Tillard, Lieutenant J. B., R.E. ...		5	0
Ward, Captain B. R., R.E. ...		5	0
Wisely, Captain	1	0	0
Wood, Colonel		10	6
Young, Captain F. H.	1	0	0
Total	24	10	6

Simla.

On 30th September a dinner was given to Sir Charles and Lady Nairne by the officers of the Royal Artillery in India, on the termination of Sir Charles's appointment as Commander-in-Chief in India.

Sir Charles was unfortunately unable to be present on account of illness, but Lady Nairne was happily able to attend.

Major-General Tyler presided, and the following officers and ladies were present:—

Mrs. Tyler, Major-General and Mrs. Wace, Brigadier-Generals Wodehouse, Spragge and Pipon; Colonel and Mrs. Stopford; Lieut.-Colonel Rochfort, Lieut.-Colonel Wolfe-Murray, Mrs. Wolfe-Murray and Miss Wolfe-Murray, and Lieut.-Colonel Owen; Major Hawkins, Major and Mrs. Mercer, Major and Mrs. Stuart, Major H. E. Stanton, Major and Mrs. Purvis, and Majors O'Neill and Cleeve; Captains F. Stanton, Bell, Dowell,

E Hobday
1896

Muspratt-Williams and Captain and Mrs. Watson; Lieuts. Nairne, Wilkinson, Moultrie, Tyrrell, Bayley and Foulkes. Other ladies present were Mrs. Townshend, Malleson, Headlam, Hanna, Williams, Gordon, Longfield, and Miss Warren,

Congratulatory telegrams were received from Field-Marshal Lord Roberts, V.C,, Brigadier-General Saunders and officers of the Royal Artillery, Madras Command; Lieut.-Colonel Anderson and officers "I," R.H.A.; the officers of the Royal Artillery, Kirkee, and Captains Geddes, Lecky and Young; the officers of the Royal Artillery, Campbellpore; Brigadier-General Sir E. Elles, Lieut.-Colonel Saunders, Major Chance and the officers of the Royal Artillery, Quetta; Major Crofton and the officers "K," R.H.A., and Major Fegen.

The plate here reproduced is from the brush of Major E. A. P. Hobday, R.A.; the vacant space in it was filled with the *menu* of the dinner.

Obituary.

LIEUT.-GENERAL *SIR* W. H. GOODENOUGH, K.C.B., whose death occurred suddenly on 24th October, 1898, at Cape Town, South Africa, joined the Regiment as 2nd Lieut., 19th December, 1849; became Lieut., 1st April 1851; Capt., 23rd February, 1856; Brevet-Major, 20th July, 1858; Brevet-Lieut.-Colonel, 25th March, 1869; Brevet.-Colonel, 5th July, 1877; Major-General, 1st April, 1886, and Lieut.-General, 19th May, 1891. Sir William Goodenough served during the Indian Mutiny, 1857-8; was present at the action of Pandoo Nuddee; siege and capture of Lucknow, and attack and capture of Fort Birwah, (severely wounded); (despatches, *London Gazette*, 25th May, 1858 and 31st January, 1859; medal with clasp and Brevet of Major; Egyptian Expedition, 1882, in command of the Royal Artillery; battle of Tel-el-Kebir; (despatches, *London Gazette*, 6th October and 10th November, 1882; medal with clasp; bronze star, 2nd class Medijie and C.B.) Sir William was Brigade-Major, Bengal, October, 1858 to January, 1859; Brigade-Major, R.A., Aldershot, 1st October, 1865 to 30th September, 1869; Military Attaché, Vienna, 31st March, 1871 to 31st March, 1874; A.-A. and Q.-M.-G., Woolwich, 1st April, 1874, to 31st January, 1876; Assistant Director of Artillery, 1st February, 1876, to 31st January, 1881; Colonel-on-the-Staff, C.R.A., S.E. District, 14th January, 1882 to 3rd August, 1882; Brigadier-General C.R.A., Egyptian Expeditionary Force, 4th August, 1882, to 30th August, 1882; Colonel-on-the-Staff, C.R.A., S.E. District, 18th November, 1882, to 31st March, 1886; Inspector-General of Artillery, 17th August, 1886, to 30th June, 1889; commanded N.W. District, 1st July, 1889, to 31st March, 1890, Thames District, 1st April, 1890, to 30th April, 1892, and at the time of his death was commanding the troops in South Africa. He was a joint author of 'The Army Book for the British Empire.'

MAJOR-GENERAL T. CUMING (retired), died at Godalming, on 17th Oct., 1898. He was first commissioned as 2nd Lieutenant, 20th December, 1854; Lieutenant, 6th March, 1855; 2nd Captain, 1st April, 1862; Captain, 1st October, 1871; Major, 5th July, 1872; Lieut.-Colonel, 1st July, 1881; Colonel, 1st July, 1885, and retired with the hon. rank of Major-General, 30th July, 1886.

COLONEL J. W. MACDOUGALL, died suddenly at Dundee, on 11t October, 1898. He joined the Madras Artillery as 2nd Lieut., 11th June, 1858; became Lieut., 27th Aug., 1858; transferred to the Madras Staff Corps, 2nd Feb., 1864; became Capt., 11th June, 1870; Major, 11th June, 1878; Lieut.-Col., 11th June, 1884 and Col., 11th June, 1888.

CAPTAIN G. M. LLOYD (retired), who died at Southampton on 12th October, 1898. Was first commissioned as Lieut., 15th Jan., 1867; became Capt., 16th Jan., 1880; and retired with a gratuity, 12th May, 1880.

12

NOTES

FROM

CORRESPONDING MEMBERS.

"DUNCAN" GOLD MEDAL PRIZE ESSAY, 1899.

THE Subject approved for the "Duncan" Gold Medal Prize Essay, 1899, is as follows:—

"The technical training of officers in Garrison Artillery."

The Rules for the Prize Essays now read:—

The Annual Gold Medal, when awarded, to be accompanied by an *honorarium* of £20; the Silver Medal by an *honorarium* of £10.

The candidates must be Officers of the Regiment who are members of the R.A. Institution.

Officers are requested to confine their Essays to about 16 printed pages of the "Proceedings" other things being equal, brevity will count towards success.

The Essays must be forwarded to the Secretary so as to reach him on or before the 1st of April

Each Essay must be *type-written* in triplicate. The Essays must be strictly anonymous, but each to have a motto, and be accompanied by a sealed envelope with the motto written outside and the name of the writer inside; further, if the writer wishes to recover from the Committee part of the cost of type-writing his Essay he should state this fact in the same sealed envelope and write outside it, above the motto, "to be opened."

All the envelopes thus marked will be opened by the Secretary after the result of the comptition has been announced, and he will send the writers the money for their type-writing expenses.

The Committee will allow a sum of £1 for type-writing each Essay.

The Essays will be submitted for decision to three Judges chosen by the Committee.

The Judges are empowered to recommend:—

1. That two Medals, one Gold and one Silver, be awarded, or
2. That only one Medal, Gold or Silver, according to the merit of the Essay, be awarded, or
3. That no Medal be awarded.

The names of the successful candidates will be announced at the Annual Meeting, and Medallists will be distinguished as such in all Lists, &c., issued from the Institution, and in the event of a University man gaining a Medal, a report of his success will be made to the University of which he may be a member.

The successful Essays will be printed and circulated to members by the Institution.

N.B.—The Committee draw particular attention to the paragraph in the Rules above on the subject of length of Essays; it is not difficult to discover the number of words in an average page of "Proceedings" matter, and so to keep an Essay within the 16 pages' limit.

List of additions to the Library and Museum during the month of November, 1898.

PRESENTED.	BY WHOM.
Extracts from the Annual Report of the President Ordnance Committee, 1897.	Secretary of State.
Smithsonian Miscellaneous Collections, No. 1125, and Contributions to Knowledge, No. 1126.	Smithsonian Institution.
Sketches on service during the Indian Frontier campaigns of 1897; by Major E. A. P. Hobday, R.A.	The Authors.
Replica di Krupp, alla Protesta del Signor Bashforth; translated with notes; by the Rev. Francis Bashforth, B.D.	
British wars of the Victorian Era: materials for translation into modern languages; by Aloys Weiss, Esq., Ph. D.	
Early history of the Royal Hospital at Chelsea, 1872.	Major R. H. Murdoch, R.A.
The Regimental Companion, containing the pay, allowances, and relative duties of every officer in the British Service; by Charles James, 1811; Three vols.	General G. G. Pearse, C.B., R.H.A.

PURCHASED.

Naval Warfare; by Vice-Admiral P. H. Colomb; second edition, 1895.
Biologia Centrali-Americana: Zoology, part 144.
German-English Dictionary; Vol. II., Part 8; by Professors Muret and Sanders.
Photographs of French battle-ships, "D'Entrecasteaux," "Bouvet," and "Massino."
Kriegsgeschichtliche Einzelschriften; Part 25.

ROYAL ARTILLERY POINT-TO-POINT

As will be seen by the accompanying accounts, there was a balance of nearly £50 lying at Messrs Cox & Co's at the beginning of the year.

This amount was not considered by the stewards large enough to justify them incurring the expense of holding a meeting this spring. It was, however, proposed, and unanimously carried, at the Royal Artillery Race Meeting, held at Pratt's on 3rd June, that a cup should be given out of the funds at the Secretary's disposal, to the first gunner home in either of the Army Point-to-Point Races, on the condition that not less than four artillery officers, subscribers of £1 or more to the R.A. Point-to-Point Fund, start for that race.

It was hoped that this proposal would increase the interest of officers of the Regiment in the Army Point Meeting, and therefore in that class of racing, and generally induce more to enter horses.

The stewards hope also that those officers who are interested in point-to-point racing and approved of a club being formed, will continue their annual subscription. If those, and they are the majority of us, who are interested in hunting, would even subscribe 5s. annually, there would be funds enough to give a cup at whatever centre there were enough gunners collected, who wished to have a race, on their horses they had been hunting, over a natural country.

Any officer having any suggestions to make would be doing the secretary a kindness by making them.

R.A. Point-to-Point in account with Messrs. Cox and Co.

Dr.	Expenditure.	£	s.	d.	Receipts.	£	s.	d. Cr.
1895.	Expense...	70	15	9	Received 1895	126	19	6
	Balance credit ...	56	3	9				
		126	19	6				
1896.	Expense...	98	19	6	Balance carried	56	3	9
	Balance credit ...	26	18	1	Received 1896	69	13	10
		125	17	7		125	17	7
1897.	Expense	89	13	6	Balance carried	26	18	1
	Balance credit ...	5	16	1	Received 1897	68	11	6
		95	9	7		95	9	7
1898.	Expense... ...	0	0	0	Balance carried	5	16	1
	Balance credit ...	48	12	7	Subscriptions	42	16	6
		48	12	7		48	12	7

WOOLWICH, (Signed) C. G. MACKENZIE, Capt., R.A.,
NOVEMBER, 1898. *Hon. Secretary.*

'HISTORY OF THE DRES OF THE ROYAL ARTILLERY'

The History of the Dress of the Royal Artillery will probably be published in the course of this month. Every guarantor and subscriber will receive his copy post free and carefully packed wherever he may be serving.

The idea of publishing a series of sets of loose sheets of the coloured plates only has been abandoned and a small second edition of 500 copies is published. The plates are so inserted that they can very easily be cut out of the book and mounted for framing if desired.

The prices at which the second edition is offered are classified as follows :—

I. To any guarantors or subscribers wanting one, each copy ... 17s. 6d.

II. To officers Royal Artillery not included in Class I. joining the Regiment after the 1st January, 1898, each copy...... 21s. 0d.

III. To all others, each copy nett.. 25s. 0d.

As the book nears completion the Committee see that their trouble and deliberation in getting none but the best work put into it are likely to be rewarded by a production of great value to each guarantor and subscriber.

OBITUARY.

CAPTAIN J. D. G. HIGGON (retired), who died at Scolton, Pembrokeshire, on 27th October, 1898, joined the Regiment as 2nd Lieut. 19th December, 1850; became Lieut. 5th August, 1852; 2nd Capt. 29th August, 1857; Capt. 10th December, 1864 and retired on an annuity 28th September, 1871.

MAJOR-GENERAL C. R. HILL (retired), whose death occurred at Walwick Hall, Northumberland, on 30th October, 1898, was first commissioned as 2nd Lieut. 1st October, 1847; became Lieut. 30th June, 1848; 2nd Capt. 28th November, 1854; Captain 24th March, 1860; Brevet-Major, 8th March, 1869; Lieut.-Col. 1st October, 1871; Col. 1st October, 1876 and retired on full pay with the hon. rank of Major-General 30th April, 1880.

LIEUT.-COLONEL H. W. J. HUBBACK died at Lausanne, Switzerland, on 28th October, 1898. He joined the Regiment as Lieut. 25th June, 1862; became Capt. 8th September, 1875; Major 25th June, 1882, and retired with the hon. rank of Lieut.-Col. 22nd July, 1885.

COLONEL J. R. KING (retired), who died at Paignton, on 25th October, 1898, was first commissioned as 2nd Lieut. 20th December, 1854; became Lieut. 25th February, 1855; 2nd Capt. 16th March, 1862; Capt. 1st October, 1871; Major 5th July, 1872; Lieut.-Colonel, 1st July, 1881, and retired with the hon. rank of Colonel 24th June, 1882.

LIEUT. A. J. S. TAYLOR, whose death occurred at Dera Ghazi Khan, India, on 9th October, 1898, joined the Regiment as 2nd Lieut. 28th June, 1893; became Lieut. 28th June, 1896 and was transferred to the Indian Staff Corps, 31st July, 1897.

CAPTAIN R. C. WELLESLEY died at Sheerness on 7th November, 1898. He was first commissioned as 2nd Lieut. 16th February, 1887; became Lieut. 16th February, 1890 and Capt. 1st September, 1897. Captain Wellesley served as orderly officer to the G.O.C. 1st Brigade during the operations of the Mohmand Field Force on the N.W. Frontier of India, 1897, and was present at the action at the Badmanai Pass. (Despatches, *London Gazette*, 11th January, 1898.)
